

## Residential, Commercial and Industrial Technical Work Group

### Summary List of Recommended High Priority Mitigation Options

[Brackets] in this document indicate “placeholder assumptions” or estimates currently in use, to be further reviewed and revised as the TWG and CAT deem appropriate.

CAT members reviewing these options should note that a number of RCI options may “overlap”, that is, have the potential to act upon the same sources of greenhouse gas emissions. In many cases, different options provide different approaches to emissions reduction, or offer elements that support other options in achieving the desired level of emission reduction. Overlaps in emissions reduction estimates from individual options will be taken into account when analyses of these options are complete and final emissions reduction and net cost estimates adjusted for these overlaps will be prepared.

	Policy Option	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value 2008– 2020 (Million \$)	Cost- Effective -ness (\$/tCO <sub>2</sub> e)	Status of Option
		2012	2020	Total 2008 2020			
RCI-1	Demand-Side Management (DSM) Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil	0.7	3.0	16.8	-\$791	-\$47	Ready for full CAT review
RCI-2	Targeted Financial Incentives and Instruments to Encourage Energy Efficiency Improvements (Business Energy Tax Credit and Private/Public Efficiency Funds)						Ready for full CAT review
RCI-3	Promotion and Incentives for Improved Community Planning and Improved Design and Construction (Third-party Sustainability, Green, and Energy Efficiency Building Certification Programs) in the Private and Non-State Public Sectors						In progress

	Policy Option	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value 2008–2020 (Million \$)	Cost-Effective-ness (\$/tCO <sub>2</sub> e)	Status of Option
		2012	2020	Total 2008–2020			
RCI-4	Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations						In progress
RCI-5	Rate structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues)	0.09	0.30	2.9	-\$152	-\$52	Ready for full CAT review
RCI-6	Provide Incentives to Promote and Reduction of Barriers to Implementation of Renewable Energy Systems						See ES-2
RCI-7	Provide Incentives and Resources to Promote and Reduction of Barriers to Implementation of Combined Heat and Power (CHP, or “cogeneration”) and Waste Heat Capture, Including Net-metering for Combined Heat and Power						See ES-7
RCI-8	Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings						Ready for full CAT review
RCI-9	Identify GHG Emissions Impacts and Measures to Avoid, Minimize, or Mitigate them for Projects Requiring Government Review, and in Designing Government Rules and Regulations						In progress
RCI-10	More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design						In progress

	Policy Option	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value 2008– 2020 (Million \$)	Cost- Effective -ness (\$/tCO <sub>2</sub> e)	Status of Option
		2012	2020	Total 2008 2020			
RCI-11	Policies and/or Programs Specifically Targeting Non- energy GHG Emissions						In progress
	<b>Sector Total After Adjusting for Overlaps</b>						
	<b>Reductions From Recent Actions (table to be added below)</b>						
	<b>Sector Total Plus Recent Actions</b>						

## **RCI-1. Demand-Side Management (DSM), Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Aug 7 meeting  
*Based on RCI Catalog Option 1.2*

### **Mitigation Option Description**

This policy is designed to use a number of different funding and incentive mechanisms to increase the investment in natural gas, propane (or liquefied petroleum gas—LPG), and fuel oil demand-side management programs. These DSM activities shall be designed to work in tandem with other strategies recommended by the CAT that also encourage energy efficiency gains in the residential, commercial and industrial sectors.

### **Mitigation Option Design**

In order to implement DSM programs for natural gas and LPG/fuel-oil consumers, a number of funding and incentive mechanisms could be considered, analogs of many of which are in place for electric-sector DSM programs (including the recently enacted I-937<sup>1</sup>), while other mechanisms are being considered by the CAT for this and other policy options.<sup>2</sup> Candidate mechanisms for increasing the efficiency with which these fuels are used in the Residential, Commercial, and Industrial sectors include revising existing statutes to enable investments in energy efficiency, potentially including not only investments that are now cost-effective on the basis of fuel costs alone, but also eligible programs that are cost-effective when the value of avoided GHG emissions are considered.

Key potential elements of this option follow. See the “Implementation Mechanisms” section below for additional possible tools for achieving the goals of this option:

- I-937-like requirements for gas utilities to acquire all cost-effective energy efficiency; Initiative 937 requires that “Each qualifying [electric] utility shall pursue all available conservation that is cost-effective, reliable, and feasible.”
- For propane and fuel oil consumers, which are served largely by local distributors (and thus are part of a fundamentally different market than gas consumers) a surcharge and/or incentive fund could be established to fund DSM activities.

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<sup>1</sup> Initiative 937, “The Energy Independence Act”, “... requires large utilities to obtain fifteen percent of their electricity from new renewable resources such as solar and wind by 2020 and undertake cost-effective energy conservation.” Text of the initiative can be found at <http://www.sestate.wa.gov/elections/initiatives/text/i937.pdf>.

<sup>2</sup> This option does not explicitly address electricity, since it is addressed through I-937. Nonetheless, many of the suggestions below and in subsequent RCI options on policy and program implementation mechanisms, including mechanisms for financing of energy efficiency improvements, also apply to programs that save electricity, and can help to ensure the goals of I-937 are met.

- Requirements, surcharges and/or funds to provide incentives for natural gas customers not purchasing gas from utilities (including large-volume industrial customers, for example) to also acquire all cost-effective energy efficiency.
- A program such as Oregon's Business Energy Tax Credits system could be a useful tool to make more efficient use of natural gas, propane, and fuel oil.
- A program of low-cost loans for efficiency improvements and to encourage performance contracting, as well as other financial options such as reinvestment funds should be considered to support energy efficiency investments.
- Programs and incentives for natural gas and LPG/fuel oil efficiency improvement should be available and provide significant opportunities for efficiency improvement in all customer classes, with special emphasis on, for example, low-income customers.

**Goals:** Gas utilities should obtain 100 percent of cost-effective, achievable DSM savings in their service territories by the year 2020. DSM programs for LPG and fuel oil customers should be instituted so as to achieve a similar level of performance.

- **Timing:** Apart from the overarching savings target mentioned above, the wide variety of potential implementation mechanisms will likely result in various implementation schedules for specific elements of this option.
- **Coverage of parties:** All parties currently involved in energy policy, regulation and implementation plus the providers and users of these fuel sources.
- **Other:**

### Implementation Mechanisms

Additional potential implementation mechanisms and considerations for this option include the following:

#### Considerations in Program Design

- Analysis of DSM potential should be prepared to assist in directing the legislative and regulatory processes to set targets and fund programs.
- High-volume transportation gas customers (those directly served by pipeline, rather than by utilities) should be required and provided with incentives to install efficiency measures.
- Implementation/administration of efficiency programs may be carried out, as appropriate, by utility (including municipal utilities and cooperatives), state agency, or third-party actors.
- Energy end-use surveys should be used to help determine efficiency potential and target DSM activities.

#### Program Options

- Subsidized energy audits for homeowners, businesses, and industries

- Consumer education (see also RCI-8).
- Focus on specific market segments that are often under-served by DSM programs (low income residential, small and medium businesses).
- Energy efficiency reinvestment funds to provide capital for efficiency improvements in specific sectors
- Incentives for specific technologies, potential including (but not limited to) white roofs/rooftop gardens/ landscaping, ground-source heat pumps, lighting, water heating, plug loads, networked personal computer management, power supplies, motors, pumps, boilers, customer-side transformers, water use reduction, appliance recycling/pick-up programs and others.
- Incentives for customer-sited renewable electricity and heat including solar photovoltaic (PV), passive solar space heat, and solar water heat (SWH). (Renewable energy incentives will be covered in more detail in RCI-6 and other options.)
- Incentives to convert fossil fuel based heating systems to biomass based heating systems, while also increasing the overall system efficiency. (Fuel-switching will likely be covered in other RCI-options as well.)

### **Related Policies/Programs in Place**

#### **Integrated Resource Planning**

In 2006, the Washington Legislature passed the Electric Utility Planning Act (ESHB 1010), requiring each consumer-owned or investor-owned electric utility, with more than 25,000 customers, to develop or update an integrated resource plan by September 2008. All plans are reviewed by CTED and must include an assessment of conservation and efficiency resources, an evaluation of renewable and nonrenewable generation, and recommendations for development of new policies and programs to obtain conservation and efficiency resources.

The Northwest Power and Conservation Council (NPCC) 5<sup>th</sup> Plan calls for reduction of 2,800 MW in electricity consumption through conservation in the next 20 years (through 2025) in the Northwest. WA State consumes about 50% of the energy in the Northwest (based on WA population compared to the rest of the region).

### **Type(s) of GHG Reductions**

GHG benefits will result predominantly from reduced CO<sub>2</sub> emissions from lower levels of natural gas, fuel oil, and LPG combustion at end-user sites. Additional upstream CH<sub>4</sub> and CO<sub>2</sub> savings could occur due to incremental reduction in natural gas transmission, distribution, processing, and extraction activities.

### **Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e**

**Preliminary**

	Policy	Reductions (MMtCO <sub>2</sub> e)*			NPV (2008–2020) \$ millions	Cost-Effective-ness \$/tCO <sub>2</sub>
		2012	2020	Cumulative Reductions (2008–2020)		
RCI-1	Demand-Side Management (DSM), Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil	0.7	3.0	16.8	-\$791	-\$47

**Data Sources:** (In-hand or to be sought): Studies of natural gas energy efficiency measures and programs in all sectors, focusing on information pertaining to the Northwest and Washington. Studies of LPG and/or heating fuel oil efficiency measures and programs, as available.

- **Quantification Methods:**

Based on the goal of achieving 100 percent of “cost-effective, achievable DSM savings” by 2020, potential savings relative to total natural gas demand are estimated with reference to national studies, using regional or WA-based studies preferentially where available. DSM savings are modeled as being ramped in over time, starting from the first year that results are assumed to accrue. The total incremental costs of efficiency improvements are estimated using levelized cost-of-savings estimates from existing studies (national, regional, and local, as available), and the cost of providing efficiency programs are estimated from existing studies of utility investment in gas energy efficiency per unit savings achieved (or projected). For energy-efficiency programs covering other fuels (LPG, heating fuel oil), data from existing programs or planned programs elsewhere are being sought, but in the interim, cost and savings estimates from studies of natural gas programs, together with estimates of LPG and fuel-oil use by sector in WA, are being used until fuel-specific estimates are available.

Application of market factors such as user receptivity and energy management industry capacity will in part determine actual achievable potential.

*(Note that energy savings and emission reductions will likely overlap considerably with other RCI options; an integrated analysis of combined impacts will be undertaken at a later stage.)*

- **Key Assumptions (preliminary -- see Annex for references and data sources)**

- Programs apply to all natural gas sales (all sectors), and to all oil products sales in the residential and commercial sectors, but to only [15%] of industrial oil products sales.
- Net levelized cost of saved energy through these programs is [\$2.1] per million Btu.

- Cost-effective, achievable savings taken as [20%] of fuel sales pending the results of research on energy efficiency potential. Savings are phased in from 2009 through 2020, with an initial “ramp-up” of programs through 2012.
- Current gas utility DSM programs invest [0.25%] of revenues in energy efficiency (placeholder estimate pending research on current practice).

### Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:** As with the existing DSM efforts on the electric side, expanded efforts work create significant numbers of jobs throughout the market from manufacturing to installation.
- **Reduced Fuel Import Expenditures:** Unknown

### Key Uncertainties

Uncertainties include the rate of development of the markets to achieve efficiency installations for these fuel sources, including the rate of acceptance by end users, and the development of training and education programs to expand the capacity of the energy management industry.

### Additional Benefits and Costs

Replacing aging boiler systems will also provide the added benefit of creating safer buildings, and therefore decrease insurance costs. In schools statewide a focus on replacing aging boiler systems with new, more efficient systems will also lead to a better more consistent standard of comfort, therefore an improved physical learning environment.

### Feasibility Issues

DSM activities on the electric side indicate that there are no significant barriers to achieving significant savings results.

Option RCI-5 ("Rate structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues)") could help to make actions/requirements related to natural gas energy efficiency more feasible by enabling utilities to recover costs and/or by decoupling sales from revenues.

### Status of Group Approval

TBD

### Level of Group Support

TBD

### Barriers to Consensus

TBD



## **RCI-2. Targeted Financial Incentives and Instruments to Encourage Energy Efficiency Improvements (Business Energy Tax Credit and Private/Public Efficiency Funds)**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Aug 7 meeting

*Based on RCI Catalog Options 1.3 and 1.5*

### **Mitigation Option Description**

Targeted financial incentives and instruments, through two primary vehicles 1) business energy tax credits and 2) private/public efficiency funds, can be used as means of encouraging energy efficiency improvements that will affect the development, design, and building of both new and existing energy-using systems in the RCI sectors. This option is designed to offer financial mechanisms to support and encourage energy-efficiency improvements in both entire buildings and in stand-alone energy systems, and in both existing and new construction. As such, it serves as a key means of implementation of programs to improve energy efficiency in new and existing buildings that are described in RCI-3 and RCI-4.

### **Mitigation Option Design**

Business energy tax credits and private/public efficiency funds are two key mechanisms for encouraging consumers in the residential, commercial, and industrial sectors, and the building sector professionals that serve them, to implement measures to improve the efficiency of new buildings and building energy systems, as well as the efficiency of existing buildings. As such, this option is designed to work in concert with options RCI-1 (DSM for gas, LPG, and propane users), RCI-3 (targeting building and community energy efficiency), and RCI-4 (focusing energy efficiency improvements in existing buildings and their operation). In addition, either or both of these mechanisms could apply to development of consumer-sited distributed renewable energy systems (see RCI-6/ES-2) and/or combined heat and power systems (see RCI-7/ES-7). Brief descriptions of the business energy tax credit and private/public efficiency fund concepts are provided below. The section that follows suggests potential implementation mechanisms and other details for these concepts.

**Business Energy Tax Credits** can provide incentives for businesses to invest in energy efficiency and/or customer-sited renewable energy systems. Washington lacks an income tax, but has business and occupations taxes (B&O taxes), typically on gross receipts, that apply to a number of different categories of businesses, and has a retail sales tax that affects most purchases made by businesses. Business energy tax credit would be applied to these types of taxes. Applying these tax credits to both new construction and retrofit projects would be a goal. Specific types of tax credits for energy-efficiency/renewable energy applications in Washington might include:

- **Energy Performance Contracting Sales Tax Exemption:** Provide an exemption from retail sales taxes (~6.5%) for those projects electing energy savings performance contracting services.

- **Superior Energy Efficiency Sales Tax Exemption:** Provide exemption from a portion of sales taxes to projects that produce buildings and other infrastructure (including, for example industrial process equipment) that have superior energy performance. This exemption would be applied both for improvements to new or existing buildings or processes, and could be applied, for example, to sales of qualifying energy efficiency services, construction materials, and high-efficiency equipment.
- **Clean Technology Businesses B&O Credit:** Provide a B&O tax credit for businesses that deliver energy-efficiency-related services.

The overarching intent of these tax credits would be to yield a nearly neutral revenue position for the State while reducing the use of fossil fuels and their climate change impact. Tax credits applied to energy efficiency or renewable energy projects will generate additional government revenues through increased local market activity and job creation, and through re-spending of energy cost savings.

**Public/Private Efficiency Funds** would provide zero- or low- interest loans for energy efficiency applications in both retrofit and new construction, as well as in non-building projects such as improvements in the efficiency of industrial processes. These loans would be used to fund the remaining portions of energy efficiency projects that are not addressed by utility rebates or business energy tax credits. Zero- or no-interest loans offer project developers and their professional service providers the opportunity to construct substantially more energy efficient projects within their budgets. Loans repayments can be made from of shared savings via energy performance contracting or through other mechanisms; public and private building or other energy-using infrastructure projects may use different repayment models.

Programs of both tax credits (on sales tax and B&O taxes) and efficiency funds/loans will need to be designed carefully to make sure that the proper incentives and signals are being provided to the markets for energy-efficiency goods and services. For example, in some building markets, such as where buildings are built by developers and then sold, sales taxes exemptions, which have a direct impact on the cost of developing buildings, may be more effective than efficiency funds or low-interest loans<sup>3</sup>.

**Goals:** Provide funding mechanisms sufficient to support the energy efficiency and building energy use improvement goals of RCI-1, RCI-3 and RCI-4, as well as those included in I-937 for cost-effective electricity efficiency, including attaining new building energy efficiency goals consistent with Architecture2030, LEED, or other suitable “green building” energy efficiency certification.

- **Timing:** Implement funding mechanisms so to support goals above.
- **Coverage of parties:** Commercial and industrial energy users in the private and public sectors (including those responsible for mixed-use projects), public agencies, utilities, building design and construction professionals, and lenders.

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<sup>3</sup> The document, [Tax Credits for Energy Efficiency and Green Buildings: Opportunities for State Action](http://www.aceee.org/pubs/e021full.pdf), by Elizabeth Brown, Patrick Quinlan, Harvey Sachs, and Daniel Williams of the American Council for an Energy Efficient Economy (2002), provides a summary of some of the approaches that can be used to establish incentives for energy efficiency, and the advantages and drawbacks of each. This document is available as <http://www.aceee.org/pubs/e021full.pdf>.

- **Other:**

### Implementation Mechanisms

Specific implementation mechanisms for **business tax credits** might include:

- **Energy Performance Contracting Sales Tax Exemption:** Provide an exemption from retail sales taxes (~6.5%) for those projects electing energy savings performance contracting services (RCW 39.35a) carried out on public buildings in the state, including schools, universities, community colleges, and state and local government buildings and energy savings performance contracting services in private buildings meeting the intent of RCW 39.35a. This exemption may also apply to non-building energy-efficiency projects. In a retrofit project the system energy use is clearly defined and therefore the tax credits should apply to the overall project for those projects improving energy efficiency by a minimum of 20% over the existing energy performance of a building or process.
- **Superior Energy Efficiency Sales Tax Exemption:** On new construction in public and private buildings, or improvements in industrial energy-using equipment (for example), tax credits would be targeted at reducing the differential between the project costs for energy code rated systems (systems meeting or only modestly exceeding the level of energy performance required by codes) versus those systems that exceed the collective energy efficiency of the building or process by 20% over that of the energy code in effect at the time, to 1% of the total project construction costs for those projects that exceed the collective energy efficiency by 50% over that of the energy code in effect at the time, and to 2% of the total project construction costs for those projects that are net-zero buildings, meaning that they consume no more energy than they produce. Guidelines and exemptions that provide similar incentives for non-building improvements may be developed along similar lines.
- **Clean Technology Businesses B&O Credit:** To compel job creation and the growth of clean technology businesses, a B&O tax credit will be provided to those businesses that deliver energy efficiency related services, to include professional services, construction services, and highly efficient products. This B&O credit will be applied to those business revenues associated with those projects and systems that also qualify for the retail sales tax credit.

For **public/private efficiency funds**, low or no-interest loans would be used to fund the remaining portion of a project that is not addressed by utility rebates or a business energy tax credit. It is expected that this funding option would cover 30 to 70% of a total project costs. In new construction (or for new process equipment purchases), this fund would only be applicable to the differential between the project costs for energy code-rated systems versus those systems that exceed the collective energy efficiency of the building by 20% over that of the energy code in effect at the time.

The State of Washington Treasurer's program does have both a COP and LOCAL loan program that provides tax-exempt financing to municipal and state entities. And many commercial financial institutions provide a variety of equipment and system tax-exempt and commercial grade lease-back options. Tax exempt interest, even at 4%, over a 10 year loan term reduces the possible energy efficiency project scope by up to 30%. Nearly 50% of the project scope is

eliminated if commercial rates of 7.5% are used to finance energy efficiency projects. Therefore, a no-interest loan program would yield significantly more energy-efficiency project scope since public and private organizations that choose to secure outside financing will be able to direct more funds at projects improving energy efficiency versus interest charges.

For public entities, the loan obligation could be guaranteed to be paid out of the annual energy savings through an energy savings performance contracting (ESPC) model. Legislation already exists that enables an ESPC delivery in existing building, and a minor modification to RCW 39.35a would allow for the use of ESPC in new construction projects and systems. There is precedent for the national and international adoption of the ESPC model. For instance, through the Clinton Climate Initiative Energy Efficiency Building Retrofit Program (C40) an international effort is in motion to leverage ESPC programs with public/private funding to complete \$5 billion in energy efficiency work internationally. For private entities the loan obligation could also be paid out of the annual energy savings through direct owner payment, micro-utility, a public/private resource management association (RMA,) a condominium association, or the energy savings performance contracting (ESPC) model.

There are different potential models for the organizations that would coordinate public/private efficiency funds, including government agencies and not-for-profit independent organizations. As noted above, these fund/loan programs—as well as the tax credit options included here, will need to be carefully designed so as to assure that their effect on the markets for energy-efficient products and services in the sectors that the programs are designed for have the desired impacts on the actors in those sectors and the markets they are designed to spur.

### **Related Policies/Programs in Place**

#### **Washington**

In 2005, the Washington legislature enacted the Renewable Energy System Cost Recovery (RCW 82.16.110) and Tax on Manufacturers or Wholesalers of Solar Energy Systems.

#### **Other States (provided for reference)**

A business energy tax credit (BETC) scheme similar to the one being successfully implemented in Oregon would serve as a good model for Washington State.

The combined spending on the BETC and RETC (residential energy tax credit) programs for 2003 totaled \$30.9 million for tax credits and program administration. The effect of these tax credits combined with spending by businesses and residences taking advantage of these tax credits had the following net impacts on the Oregon economy in 2003:

- Output in Oregon's economy increased by \$42.5 million
- 182 new jobs were created in Oregon
- Oregon wages increased by \$8.6 million
- Tax revenues for state and local government increased by \$2.7 million
- Oregon commercial and residential energy costs decreased by \$27.9 million

From [http://www.oregon.gov/ENERGY/CONS/docs/EcoNW\\_Study.pdf](http://www.oregon.gov/ENERGY/CONS/docs/EcoNW_Study.pdf)

In Oregon, the tax credit is 35 percent of the eligible project costs - the incremental cost of the system or equipment that is beyond standard practice. You take the credit over five years: 10 percent in the first and second years and 5 percent each year thereafter. If you can't take the full tax credit each year, you can carry the unused credit forward up to eight years. Those with eligible project costs of \$20,000 or less may take the tax credit in one year.

Trade, business or rental property owners who pay taxes for a business site in Oregon are eligible for the tax credit. The business, its partners or its shareholders may use the credit. The applicant must own or be the contract buyer of the project (the project owner). The business must use the equipment for the project or lease it for use at another site in Oregon. A project owner also can be an Oregon non-profit organization, tribe or public entity that partners with an Oregon business or resident who has an Oregon tax liability. This can be done using the Pass-through Option. Many projects qualify. They include: Conservation, Lighting, Recycling, Alternative Fuels, Hybrid Vehicles, Rental Dwelling Weatherization, Transportation, Efficient Truck Technology, Sustainable Building. The tax credit can cover all costs directly related to the project, including equipment cost, engineering and design fees, materials, supplies and installation costs.

Tax credits can apply to retrofits, new buildings, co-generation projects, and renewable resource projects.

There are a number of schemes currently being implemented, which bring together public and private investment to encourage energy efficiency in new and old buildings. Most 'efficiency funds' are being implemented on the local/city level but could be adapted to Washington State. Taking parts of each of the schemes may be the best approach for a state-wide fund.

Using the Cambridge Energy Alliance as a model, form a independent non-profit that will assist residents, businesses and institutions and provide technical experts with figuring out what to do, finding the right people to do it and obtaining the funds to pay for energy efficiency programs, including low-interest loans that will be repaid out of documented energy savings. The fund could apply to retrofits, but also to new construction to help market driven projects achieve significantly higher levels of energy efficiency than the market will currently support. This organization could have a roster of banks that have bought into the idea that can provide low interest loans for energy efficient strategies and can be paid back through the energy savings provided by the loan (as in the case of the Clinton Climate Initiative Energy Efficiency Retrofit program). As with both the CEA and the Toronto Atmospheric Fund, start-up money for an organization of this type could come from private sources or the sale of state owned land.

### **Type(s) of GHG Reductions**

This option would yield GHG reductions from energy efficient buildings and other energy-using systems by supporting other RCI options in reducing the overall use of electric and fossil fuels.

### **Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e**

- **Data Sources:**
- **Quantification Methods:**

As noted above, this option supports the achievement of the energy efficiency goals of other RCI options (RCI – 1, 3, and 4) by providing additional financial mechanisms for funding of efficiency improvements. As a result, estimating the emissions savings for this option would double-count the emission savings reported for the options that RCI-2 supports. It would be helpful, however, to understand specifically the overall tax and funding implications of the above mechanisms, which could be approached by considering the impacts of different types of financial incentives on the net cost to developers of implementing energy-efficiency improvements, and if possible, estimating the general magnitude of savings that these mechanisms might encourage.

- **Key Assumptions:**

#### **Contribution to Other Goals**

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
  - Provide financing strategies beyond what the private sector market will support today for long-term benefits
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

#### **Key Uncertainties**

[Insert text here]

#### **Additional Benefits and Costs**

- Consider impact on government revenues and stimulation of economy through market creation.

#### **Feasibility Issues**

The business tax exemption faces the typical challenges related to issuing tax breaks, however since this initiative would generate projects, save energy costs in public facilities, and create jobs, it is expected that a fiscal analysis (looking at all factors, not just lost tax revenue) would show a positive economic impact to the State.

Feasibility issues might lie in the public/private funding initiative that relies on public money to support private investments. This issue would need to be worked through appropriately. Important key element of this is to create mechanisms that allow payment of loans in both retrofit and new construction through the savings from energy efficiency for both public and private entities. Also, to make sure that Washington state law allows condominium associations and other entities to guarantee the loan, as well as allowing the formation of resource management associations, ESPC, and micro-utilities at the project level.

It will be important to set the correct improvement benchmark to receive the economic incentive benefits. Having a sliding scale for greater efficiency will be very useful.

#### **Status of Group Approval**

TBD

#### **Level of Group Support**

TBD

## **Barriers to Consensus**

TBD



### **RCI-3. Promotion and Incentives for Improved Community Planning and Improved Design and Construction (Third-party Sustainability, Green, and Energy Efficiency Building Certification Programs) in the Private and Non-State Public Sectors**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Aug 7 meeting  
*Based on RCI Catalog Options 2.2 and 2.4*

#### **Mitigation Option Description**

Energy used in residential, commercial, and industrial buildings contributed roughly 20% of Washington's GHG emissions in 2005. As such, it is recommended that goals be set to encourage all new construction, both residential and commercial, to meet significantly higher energy efficiency standards in the near future. Efficiency standards should take into account all the energy required in the entire building process, including the amount of energy needed to make building materials along with the performance of the building through its use. This combination of building performance and embodied energy will produce a metric for life-cycle GHG emissions that designers and builders can look to improve upon.

Improved community planning<sup>4</sup> aims to create communities that are, among other attributes, livable, designed for reduced use of energy both within homes and businesses and in the transport sector, and have a reduced environmental impact relative to typical developments. Variants on the smart growth concept exist, but many call for clustering living units with easy access (often walking distance) to shops, schools, and entertainment and recreational facilities, incorporating elements of energy efficient design and renewable energy in buildings, sharing energy facilities between buildings (for example, district heating systems), and preserving open spaces.

These two concepts—significantly improved building energy performance and improved community planning—offer significant synergies for Washington. This policy suggests a combination of incentives and targets to induce the owners and developers of buildings and the communities in which they are located to produce and operate buildings and communities that produce markedly lower GHG emissions than existing buildings and communities..

#### **Mitigation Option Design**

##### **Improved Building Design and Construction**

This policy provides incentives and targets to induce the owners and developers of new and existing buildings in each of the RCI sectors to improve the efficiency with which energy and other resources are used in those buildings, along with provisions for raising targets periodically and providing resources to building industry professionals to help achieve the desired building performance. This policy can include elements to encourage the improvement and review of energy use goals over time, and to encourage flexibility in contracting arrangements to

<sup>4</sup> See, for example, [http://www.epa.gov/smartgrowth/about\\_sg.htm](http://www.epa.gov/smartgrowth/about_sg.htm) for additional information about Smart Growth.



encourage integrated energy- and resource efficient design and construction. Several design standards exist that can be drawn upon to promote improved design and community planning, including LEED<sup>5</sup>, Architecture 2030<sup>6</sup>, National Association of Home Builders (NAHB) Green Home Building Guidelines<sup>7</sup>, Built Green<sup>8</sup>, Energy Star Homes Northwest and Green Globes<sup>9</sup>. This policy could also include consideration of the concepts of embodied energy and “renewability” of building materials.

### **Improved Community Planning**

Like construction of buildings and facilities themselves, land use decisions have a significant impact on regional and statewide greenhouse gas emission profiles. Research in California, NYC and elsewhere has begun to quantify this impact. California building energy researchers estimate that 10-15% of potential statewide reductions can be achieved through land use planning changes. New York City is estimating 15.6 million metric tons will be reduced through smart growth planning and design (accounting to approximately 30% of *their* total reduction strategy). Efficient community planning holds perhaps the greatest potential for future reductions of any mitigation strategy. Note that a key benefit of efficient community planning, depending on how it is carried out, can be significant reductions in transportation energy use (both passenger and goods transport). An option under consideration in the Transportation TWG, T-4, “Promote Compact and Transit-oriented Development”, makes explicit recognition of this benefit.

Potential design elements for this option, addressing, separately and together, these two major concepts, include the following (see “Implementation Measures” below for further details and possible approaches):

- Create tax incentives for new and rehabilitated energy-efficient commercial and residential buildings, as well as new master planned communities.
- Tie state economic development funding to meeting building and community design standards.
- Provide incentives that encourage and promote the use of climate-friendly products in both commercial and residential buildings and building materials.
- Support and provide incentives for programs that recognize embodied energy and operational energy in the building process. This would include using informational approaches, support for certifications, and other means to support the consideration of life-cycle emissions in the building sector.
- Develop programs for and provide education and training to consumers and in schools, as well as targeted professional training, to support the elements of this option. Professional training could include certification of building professionals as “green building certified”.

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<sup>5</sup> See, for example, <http://www.usgbc.org>.

<sup>6</sup> <http://www.architecture2030.org/home.html>

<sup>7</sup> <http://www.nahbrc.org/greenguidelines/>

<sup>8</sup> Built Green is a Washington-based program that includes green building guidelines and certification. Built Green works closely with the National Association of Home Builders on the latter’s programs. See, for example, <http://www.builtgreen.net/checklists.html>.

<sup>9</sup> <http://www.greenglobes.com/fitup/Non-Flash/index.htm>

- Continue to emphasize regular improvements in building energy codes, and improvements in the enforcement of building energy codes through, for example, specific training of code inspectors in building energy code enforcement (as noted, for example, in RCI-8).
- Develop and continue to refine tools and standards to measure the GHG implications of different building approaches.
- Use a variety of policy and administrative levers to promote and provide incentives for community planning (including planning in both new and existing communities) that incorporates GHG emissions considerations, and to discourage the construction of communities that do not. Identify and modify existing laws and regulations that are obstacles to planning and developing low-emissions buildings and communities, including obstacles to making existing communities more efficient<sup>10</sup>. Provide local governments with analytical and policy tools to promote low-GHG-emissions community development, and encourage cooperation between jurisdictions to provide a consistent and strong approach to achieving community planning goals.
- **Goals:**
  - A target percentage of GHG emissions reductions from the buildings sector should be set so as to be consistent with the Governor's goals.
  - Expand the use of climate-friendly products in building materials.
  - Consider going beyond existing certification programs to Architecture 2030-level goals for new buildings, providing energy consumption performance (energy intensity) that is 50% of the regional average for each building type, or define goals as the higher levels of LEED (Gold/Platinum), higher levels of Built Green (4-Star, 5-Star), or similarly-stringent certifications in other systems of standards.
  - Explicitly identify the link between GHG reductions and land use planning decisions, as well as the reduction potential and target(s) for Washington state<sup>11</sup>
- **Timing:** As stated above, the timing of the goals should track the goals set by the Governor's Executive Order.
- **Coverage of parties:** All builders, building material suppliers, recycled building material sellers, and home improvement stores. The aforementioned should be considered for both private and public construction projects.
- **Other:**

### Implementation Mechanisms

A number of potential implementation elements of this option are offered below and are grouped into several general categories:

<sup>10</sup> For example, by allowing/encouraging greater density of energy-efficient housing in existing neighborhoods that have nearby services accessible by foot, bicycle, or mass transit.

<sup>11</sup> Note that this is a category more easily measured on a regional or statewide basis than at the local government level because it includes things like "avoided sprawl" which has statewide reduction impact but may result in increased density (and emissions) locally.

### **Improved Design and Construction**

#### **General incentives and promotion:**

- Create a tax incentive for new energy-efficient commercial and residential buildings, as well as new master-planned communities, using the Oregon incentives as a model. To maximize effectiveness, tax incentives should target cutting-edge, very high-efficiency technologies or practices that customers might not find otherwise. The incentives should be large enough to affect decision-making, while reporting requirements should be just stringent enough to make fraud insignificant.
- Support and provide incentives for programs that recognize embodied energy and operational energy in the building process.
- Encourage state agencies to utilize the LEED rating system or the Green Globe rating system to promote the construction and design of energy-efficient buildings.
- Provide tax credits for construction of a green building or rehabilitation of an existing structure to green building standards.
- The state could provide incentives that encourage and promote the use of climate friendly products in both commercial and residential buildings and building materials.
- Implement policies that encourage utilities to make renewable energy more widely available (note that this implementation measures likely will overlap with those of other RCI and ES options).
- Increase and extend the tax credit for PV, biomass and wind that are mandated in SR 5101 to meet the standards of other states.

#### **Consideration of life-cycle emissions:**

- Consideration of concepts of embodied energy in and “renewability” of building materials<sup>12</sup>
- Include embodied energy/carbon footprint/life cycle assessment information for building materials in green building standards such as LEED, Built Green, NAHB, Energy Star Homes Northwest, or Green Globes.
- Targeting reduction of emissions from diesel engines used in new construction developments.
- Develop and support a business assistance program to help identify and achieve GHG goals and life-cycle cost analysis of buildings and building components.
- Promote measures to reduce urban “heat island” effects through integrated strategies, including - green roofs, white roofs, plantings.
- Include carbon footprint information/literature on materials in building supply and home improvement stores.

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<sup>12</sup> See, for example, CORRIM (Consortium for Research on Renewable Industrial Materials), Life Cycle Environmental Performance of Renewable Building Materials in the Context of Residential Construction, available from [http://www.corrim.org/reports/2005/final\\_report/index.htm](http://www.corrim.org/reports/2005/final_report/index.htm).

**Education and training:**

- Provide training and certification of building professionals in green building-related specialties. Provide suitably trained building professionals with “green building” certification so that potential purchasers and developers of green buildings can be assured that builders and designers so designated are equipped to produce green buildings. A preliminary step here would be to adapt, adopt, and/or develop a suitable set of qualifications that building professionals must meet to receive a green building certification.
- Provide consumer and primary/secondary education related to green building and green communities.
- Increase private sector education to promote high performance green buildings.
- Provide incentives for building operator certification.

**For tools and standards:**

- Set up a clearinghouse for information on and access to software tools to calculate the impacts of energy efficiency and solar technologies for buildings, including tools for use by local governments in evaluating community design options. Encourage cooperation between local governments on community planning issues, with the ultimate goal of promoting high participation by governments across the region.
- Encourage, through promotions and incentives, private standards for green building and sustainable forest management (such as SFI, CSA, PEFC, FSC), as well as green building product certification for other building materials, such as Greenseal.
- Set a cap on consumption of energy per unit area of floor space for new buildings, and consider mechanisms to discourage the construction of residential dwellings that are larger than needed.

**Improved Community Planning**

- Create incentives to encourage smart growth and support the GMA (Growth Management Act) by meeting Built Green Community certification, or LEED-ND gold level, with minimum energy and location criteria.
- Improve planning to reduce sprawl modeled after efforts by the Center for Clean Air Policy<sup>13</sup>, the state of California, and the Institute for Local Government<sup>14</sup> including the “California Communities Climate Action Plan” and the “California Green Community” rating tool.
- Condition approval of hook-ups to city, county and utility services upon GHG emissions reduction plans.
- Implement administrative changes to enhance integrated design of communities and transport systems.

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<sup>13</sup> <http://www.ccap.org/>

<sup>14</sup> <http://www.cacities.org/index.jsp?zone=ilsg>

- Promote consideration of location as part of a building's GHG "footprint".
- Reinforce the importance of Growth Management and conservation easements linked to Transfer of Development Rights.
- Implement or adjust hookup fees for new developments to provide incentives for smart growth.
- Move from a State Dept. of Transportation to a State Department of Urban, Rural, and Regional Mobility.
- Establish a State Department of Urban Design.
- Tie disbursement of transportation funds to collaborative planning at a regional level.
- Review existing land use, building codes, and related laws and regulations, and consider modifications to laws and regulations as necessary, to assure that existing regulations and laws do not pose barriers to improved building performance and/or community planning.
- Utilize key State government leverage points to push smart land use planning approaches: including SEPA, housing elements, and others.
- Require that all projects requiring government review identify GHG emission impacts and reduction options: Require that SEPA reviews quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for projects requiring government review.
- Add climate protection as a required element of local planning under the state Growth Management Act.
- Facilitate a coordinated long-range local government planning process to better coordinate land use, transportation and economic development.
- Consider restricting financial and technical assistance to priority growth areas (as in Maryland).
- Participate in multi-state efforts to qualify and quantify the impacts of land use on energy and environmental systems.
- Support growth of localized agricultural food production and community-supported agriculture programs.

### **Related Policies/Programs in Place**

#### **LEED**

Executive Order 05-01, directs the adoption of green building practices in the construction of new or renovated existing state buildings (>25,000 ft<sup>2</sup>), as well as mandates a 10% reduction in State Agency energy purchases from 2003 levels by September 1, 2009 and LEED silver standards for WA public buildings.

High-Performance Public Buildings bill (Chapter 39.35D RCW), requires all new state-funded facilities over 5,000 sq. ft. to meet green building standards. Major office and higher education facility projects will be required to achieve the US Green Building Council Leadership in Energy

and Environmental Design rating standards (referred to as LEED™ Silver certification). New K-12 schools will be required to meet the Washington Sustainable Schools Protocol (WSSP) or LEED certification. The Department of General Administration's Sustainable Design and Construction program oversees the construction or reconstruction of state and state funded facilities built to LEED standards. The Department of Community, Trade, and Economic Development is required to adopt sustainable building standards by July 1, 2008. The legislature prioritized the use of locally extracted and manufactured products in all state building projects. LEED requirements do not apply to affordable housing projects that receive state funding,

Several local governments offer [LEED Incentive Programs](#). The City of Seattle's LEED Incentive program offers incentives to commercial projects based on LEED certification level achieved. Seattle's Built Green Incentive program assists with green residential single and multi-family projects. There are several tax incentives available in Washington State for solar and renewable energy products, which can be incorporated into green buildings.

Ecology's Solid Waste and Financial Assistance Program is actively involved in promoting Green Building (GB) by training architects, builders, and lenders on Green Building and working with governments, communities, schools, commercial and residential sectors on GB initiatives. Some of the activities include:

- Working with some counties to adopt GB in Solid Waste Plans.
- Maintaining the Website developed at Ecology.

Smart Growth Strategy for the 21<sup>st</sup> Century (<http://smartgrowth.wa.gov> CTED)

[It has been noted that Snohomish County is assessing its GHG footprint. A short description of this program will be included here when available.]

[A discussion of model policies and programs implemented in other states and countries, noting key benefits, costs, and other impacts experienced in those efforts, will be included when available.]

### **Type(s) of GHG Reductions**

GHG benefits will result predominantly from reduced CO<sub>2</sub> emissions from lower levels of natural gas, fuel oil, and LPG combustion at end-user sites, and from reduced central-station fossil-fueled electricity generation caused by reduced end-user demand for electricity. Additional upstream CH<sub>4</sub> and CO<sub>2</sub> savings could occur due to incremental reduction in natural gas transmission, distribution, processing, and extraction activities.

Reductions may also be achieved by substituting more energy intensive building materials with building materials that rely on less energy and therefore, produce fewer GHG emissions. Recommendations in this area should consider full life cycle impact, including energy required to condition/operate space following occupancy (e.g. buildings constructed of low intensity building materials may require more energy to condition based on thermal massing potential, etc.).



“Avoided Sprawl” through community planning measures may have significant impacts on transportation energy use and associated GHG emissions, in addition to its impacts through savings in building energy use.

### Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e

- **Data Sources:**

Possible references for estimating GHG emissions reductions and associated costs include:

Improved Design & Construction:

- Buchanan, A.H. and S.B. Levine. 1999. Wood-based building materials and atmospheric carbon emissions. *Environmental Science and Policy*. 2: 427-437.
- Eriksson, P.E. 2003. *Comparative LCA:s for wood construction and other construction methods- Energy use and GHG emissions*. A study compile on behalf of the Swedish Wood Association, now part of Swedish Forest Industries Federation, Stockholm. <http://www.Svenskttra.org/pub/lca.pdf> (accessed Feb 28, 2007).
- Miner, R. 2006. The 100-year method for forecasting carbon sequestration in forest products in use. *Mitigation and Adaptation Strategies for Global Change*. Published online 20 May 2006. Springerlink.
- Perez-Garcia, J., B. Lippke, D. Briggs, J. Wilson, J. Bowyer, and J. Meil. 2005. The environmental performance of renewable building materials in the context of residential construction. *Wood and Fiber Science* 37 CORRIM Special Issue: 3-17.
- Thormark, C. 2006. The effect of material choice on the total energy need and recycling potential of a building. *Building and Environment* 41:1019-1026.
- U.S. Department of Energy. 2006. Forestry Appendix to Final Technical Guidelines for Voluntary Reporting of Greenhouse Gas Program, 1605(b).

Improved Community Planning:

- "The Role of Land Use in Meeting California's Energy and Climate Change Goals."
- Smart Growth Strategy for the 21<sup>st</sup> Century (<http://smartgrowth.wa.gov> CTED)

- **Quantification Methods:**

Proposed Quantification Approach: This option has provides two central, but not necessarily separate, approaches to improving the efficiency of new buildings: 1) providing tools and incentives to improve the energy efficiency (and reduce the GHG embodied in materials for) new building construction, and 2) improving community planning so that buildings in new communities, and the communities themselves, are less GHG-intensive. It is proposed to approach analysis of these two elements separately by working with the TWG to set targets for the fraction of new buildings covered by “smart growth” initiatives, then targeting a fraction of the remaining new buildings to be constructed in WA that will reach “green building” or, specifically, Architecture 2030

targets. For each of these groups—the fractions will ramp in over time and the building units involved will be estimated based on projections of growth in housing and commercial floor area—a level of electric and gas energy (and, if applicable and data are available, GHG emissions savings in building products) will be ascribed to the number or area of participating buildings to estimate total energy savings. Transportation energy savings from the “Smart Growth” element will be estimated in coordination with the TLU TWG. The costs of smart growth or green building relative to standards practice will be sought from existing studies, with TWG input.

*(Note that energy savings and emission reductions will likely overlap considerably with other RCI options; an integrated analysis of combined impacts will be undertaken at a later stage.)*

- **Key Assumptions:**

### Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
  - Would have a significant impact on GHG emissions reduction over the long term
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

### Key Uncertainties

[Insert text here]

### Additional Benefits and Costs

Improvements in building energy efficiency and community design, including the reduction of transport energy use provided by improved community design, can be expected to have positive impacts on air quality by reducing emissions of local pollutants. These in turn may have significant positive impacts on human health.

Improvements in community design that encourage pedestrian and bicycle transit can provide the added benefit of increasing the physical activity of and interaction among members of the community.

Improvements in community design may contribute significantly to the preservation of forest lands, with possible impacts on reducing loss of carbon from forest biomass stocks that might otherwise have been removed.

### Feasibility Issues

[Insert text here]

### Status of Group Approval

TBD

### Level of Group Support



TBD

## **Barriers to Consensus**

TBD

## **RCI-4. Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Aug 7 meeting  
*Based on RCI Catalog Option 2.6*

### **Mitigation Option Description**

Existing buildings will continue to consume the bulk of the energy used in the residential and commercial sectors in Washington for many years. This option would promote and provide incentives for the improvement of the energy efficiency of the existing building stock. Key to reducing energy use and GHG emissions in existing buildings are building operations, maintenance, and occupant behavior (for example, via total resource management systems).

### **Mitigation Option Design**

This option is designed to facilitate substantial improvements in the efficiency of existing buildings in Washington through a combination of measures related to building design, code enforcement, energy performance review, and improvements in building operations. Elements of this option are expected to work in concert with lending/financing elements of RCI-2, and with energy efficiency incentive and building/community design elements of RCI-1 and RCI-3.

Potential elements of this option could include:

- Promoting retro-commissioning and Building Operator Certification (BOC) in all facilities of large-portfolio organizations.
- Supporting code enforcement, retro-commissioning, and building operator certification, as applicable, when buildings are sold.
- Support for energy efficiency lending.
- Encouraging free market economy functions that achieve performance standards rather than imposing specific types of costs.
- Commercial benchmarking and retro-commissioning consistent with 2030 Challenge baseline work (and/or with other green building certification systems).
- Focusing on building operations, maintenance, and occupant behavior.
- Encourage the retrofitting of existing buildings to significantly improve the energy efficiency of the existing residential, commercial, and industrial building stocks (see goals below).
- Requirements for upgrading the energy efficiency of buildings at the time of resale, and/or evaluation (as needed) and labeling of building energy efficiency when buildings

are purchased or leased so that the financial impacts on new owner/renter related to energy consumption can be clearly recognized<sup>15</sup>.

- A requirement that a full time resource conservation manager be located on the premises of all medium to large business or agency.

Note that some of these elements will be more applicable to commercial and industrial buildings than to residential buildings, and vice versa, and in many cases flexible application of requirements and incentives will be needed in projects, such as mixed-use residential and commercial projects, that do not fall readily into specific consumer categories.

- **Goals:**
  - Propose energy performance metrics that help define and communicate energy use and environmental impact
  - Identify systems that can accelerate savings and lower cost of implementation
  - Reduce energy use in the existing residential, commercial and industrial building stock by an average of 50% [*Note to TWG--is this achievable?*] in the near term [*specify date – 2020?*], with long term target of carbon neutrality.
- **Timing:**
- **Coverage of parties:**
- **Other:**

### Implementation Mechanisms

More specific possible implementation mechanisms for some of the elements of this option include:

#### **Promote retro-commissioning and BOC in all facilities of large portfolio organizations:**

- Require benchmarking and commissioning whenever buildings are financed or refinanced.
- Require utilities to establish comprehensive program to promote and facilitate retro-commissioning of existing buildings, in particular regular inspections of boilers and air conditioning systems
- Voluntary lighting upgrades supported by state technical assistance (see

#### **Focus on building operations, maintenance, and occupant behavior:**

- Provide consumers with real-time information on their energy consumption: provide incentives for in-home displays (concept of an energy “dashboard” or “speedometer”) of energy use, energy costs, carbon consumption, water use, etc., and include context, e.g., how are you doing compared to your neighbors. Couple with information on products/services available for investment

<sup>15</sup> Requirements for upgrading may cause difficulties for low-income consumers wishing to sell their homes. See “Feasibility Issues” below.

- Job development and career training: one constraint to deep energy savings is the lack of trained professionals and trades people that can provide solutions and implement strategies. There is a need for additional educational and training opportunities aimed at the construction industry. Certification of building professional in “green building”, as noted in RCI-3 and RCI-8, is also desirable.
- Consider a ban or requirement to eliminate inefficient lighting fixtures (San Francisco is considering an ordinance to eliminate all existing T-12 lighting within City limits; California is considering a ban on sale of incandescent light bulbs)
- Conduct a state-wide campaign aimed at encouraging behavioral changes. Models in California (e.g. Flex Your Power) have had significant success at reducing statewide residential energy demand.

### **Requirements for upgrading the energy efficiency of buildings at the time of resale**

- Establish minimum energy performance standards and/or cap energy budgets at the time of sale.
- Establish (or facilitate by opening up legal pathway) point of sale and point of rental requirements for energy efficiency audits and upgrades, including labeling of the energy efficiency of buildings being rented or sold. Models for this type of program have been developed by Berkeley, San Francisco, Oakland, and by Austin (TX) could be applicable.
- Provide assistance to affordable housing to allow those properties to meet the same energy performance standards.
- Secure commitment of state and local government entities to undertake energy efficiency upgrades and operational changes in government owned and operated facilities as a first step in moving the market.

### **Related Policies/Programs in Place**

LEED requirements apply to some remodeled building, see RCI-3.

LEED-EB is applicable to the existing commercial building stock and provides a good guideline for achieving operational savings.

The Built Green program and others certification standards may also be applicable to energy efficiency upgrades of existing buildings as supported by this option.

[Note: A CAT member has provided materials related to “minimum energy efficiency Time-of-Sale Ordinances” from several US and overseas jurisdictions that could be summarized here]

### **Type(s) of GHG Reductions**

[Insert text here]

### **Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e**

- **Data Sources:**
  - ACI Summit: Moving Existing Homes Toward Carbon Neutrality:
    - Industry Stakeholder Recommendations for DOE’s RD&D for Increasing Energy Efficiency in Existing Homes

([http://www.affordablecomfort.org/images/Uploads/f\\_ind\\_stake\\_recommenations.pdf](http://www.affordablecomfort.org/images/Uploads/f_ind_stake_recommenations.pdf))

- Whole-House Energy Analysis Procedures for Existing Homes  
([http://www.affordablecomfort.org/images/Events/30/E\\_WholeHouseEnergyAnalysis.pdf](http://www.affordablecomfort.org/images/Events/30/E_WholeHouseEnergyAnalysis.pdf))
- Existing Homes Target Market Assessment  
([http://www.affordablecomfort.org/images/Events/30/B\\_marketreportdoemod.pdf](http://www.affordablecomfort.org/images/Events/30/B_marketreportdoemod.pdf))
- US Residential energy expenditure  
([http://www.affordablecomfort.org/images/Events/30/C\\_US\\_Residential\\_energy\\_expenditure.pdf](http://www.affordablecomfort.org/images/Events/30/C_US_Residential_energy_expenditure.pdf))
- UNEP, “Buildings and Climate Change: Status, Challenges and Opportunities.”  
([http://www.uneptie.org/pc/sbc/documents/Buildings\\_and\\_climate\\_change.pdf](http://www.uneptie.org/pc/sbc/documents/Buildings_and_climate_change.pdf))
- Summary and Recommendations of the *Getting to Fifty* Summit  
([http://www.newbuildings.org/gtf/documents/GT50\\_Summit\\_Final\\_Report.pdf](http://www.newbuildings.org/gtf/documents/GT50_Summit_Final_Report.pdf))
- Options for Energy Efficiency in Existing Buildings  
(<http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF>)
- **Quantification Methods:**  

Proposed Quantification Approach: Start with estimates of energy use (electricity, natural gas, and other fuels) in private-sector buildings in Washington, possibly by sector, and ramp in assumption of [50] percent reduction in (electricity and fossil-fuel) energy use in existing buildings by [2020]. Use existing studies of the cost of building energy efficiency improvements to estimate the cost of making these improvements (through retrofits or improvements in operations) to estimate the incremental cost of the option. *(Note that energy savings and emission reductions will likely overlap considerably with other RCI options; an integrated analysis of combined impacts will be undertaken at a later stage.)*
- **Key Assumptions:**

#### Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

#### Key Uncertainties

[Insert text here]

#### Additional Benefits and Costs

[Insert text here]

#### Feasibility Issues

If this option includes required upgrading of residences to improve their energy efficiencies to meet code requirements at the time of sale, residents who depend on the value of their home to fund their retirement, but who may not be able to afford the necessary upgrades to ready their house for sale.

[Insert text here]

#### **Status of Group Approval**

TBD

#### **Level of Group Support**

TBD

#### **Barriers to Consensus**

TBD

## **RCI-5. Rate Structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues)**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Sept 7 meeting

*Based on RCI Catalog Option 5.3*

### **Mitigation Option Description**

Traditional regulatory frameworks tie a utility's recovery of fixed costs of providing service (for example, infrastructure costs) to the quantity of energy sold. There is thus a perverse incentive for utilities to increase sales in order to increase revenues and minimize investments in energy efficiency (which will simply lead to lower than anticipated sales). Most Washington gas and electric utilities do incorporate some form of rates that provide incentives to conserve energy and/or reduce loads in their rate structures, but there are opportunities to further use rate design and metering infrastructure to support the reduction of greenhouse gas emissions.

This option includes elements of utility rate design that are geared toward reducing greenhouse gas emissions, often with other benefits as well, such as reducing peak power demand. The overall goal of this option is to revise rate structures—and provide metering technologies to implement revised rate structures--so as to better reflect the actual economic and environmental costs of producing and delivering electricity as those costs vary over time.. These new rate designs provide consumers with information reflecting the impacts of their consumption choices.

### **Mitigation Option Design**

Potential elements of this option could include:

- Implement rate structures and utility cost recovery rules that “decouple” the level of gas and electric utility sales from the net revenues earned by investor-owned utilities. Decoupling mechanisms have been implemented or are under consideration in a number of western states<sup>16</sup>, and several Washington utilities have received or applied for permission from the Utilities and Transportation Commission to implement decoupling at least to some degree (see Related Policies/Programs in Place, below). (Note that decoupling is not, generally, applicable to the operations of municipal and cooperative utilities.) Decoupling, if introduced, should be geared exclusively to removing barriers to utility investment in programs to increase their customers' energy efficiency and reduce customer loads. Decoupling mechanisms should be carefully designed so as to avoid, as much as possible, adverse economic impacts on ratepayers so that factors other than

<sup>16</sup> A review of states' experience in decoupling is provided in the report [Aligning Utility Interests with Energy Efficiency Objectives: A Review of Recent Efforts at Decoupling and Performance Initiatives](http://www.aceee.org/pubs/u061.htm), by Marty Kushler, Dan York and Patti Witte of the American Council for an Energy-Efficient Economy, available as <http://www.aceee.org/pubs/u061.htm>.

energy efficiency investments—such as economic downturns—do not adversely affect rates, and to assure that any decoupling mechanism is fair to both consumers and shareholders.

- Implementing, where not already used and as appropriate, tiered (increasing block) rates for electricity and natural gas use, which provide affordable base usage rates for residential consumers, but which increase with increasing consumption.
- Implementing different types of rate structures and bases for rate structures, including designing rates that to encourage construction of homes that are sized so as to reduce energy use. Any new rate structures, however, should be designed so as not to have a negative affect on low-income electricity and gas consumers, and/or should be coupled with the development of programs to allow low-income consumers to take advantage of opportunities to reduce their bills.
- In conjunction with other RCI options and existing initiatives in Washington, providing programs that offer incentives for consumer behavior that is more energy efficient (for example, energy-efficient customer rebate programs). The benefits of these programs are that they educate consumers on the impacts of their energy use and motivate them to conserve energy.
- Encourage demand response programs that provide incentives to customers to voluntarily reduce their load at times of system peaks, and implement time-of-use (TOU) rates provide an incentive for customers to shift their usage from peak to non-peak periods and thereby, reducing the need for utilities to have to utilize their least efficient, least environmental-friendly generation resources.
- Implement “Smart Metering”--consumer electric meters showing real-time pricing and the level of GHG emissions related to consumption at any given time. Smart meters are described as providing consumers with the information needed to make consumption choices, and can include the capability for consumers to adjust the type of power (for example, “green” versus conventional power) “on the fly”.<sup>17</sup>

Regulations and regulatory frameworks exist in Washington to develop and implement rate structures that provide incentives for energy efficiency improvement, and such rate structures are under discussion or being implemented in several utility areas (see “Related Policies and Programs in Place). Utilities, regulators, and other should work with and within these regulations and frameworks to develop additional rate structures that contribute to GHG emissions reductions.

- **Goals:**

- Develop and implement a pilot program of installation of smart meters at residential customers’ sites by 2009, with installations starting in 2010. The pilot program could target installation of smart meters in roughly one (1) percent of

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<sup>17</sup> A study on “smart metering” was, as of late August, 2007, being contracted for by CTED, with results expected in late 2007. A brief description of Smart Metering, and its planned implementation by a utility in the Detroit (MI) area, is available at <http://www.detnews.com/apps/pbcs.dll/article?AID=/20070813/BIZ/708130348>.



homes in Washington. The pilot program may also include installations of smart meters for commercial and industrial consumers.

- Implement customer rebate and education programs, and changes in rate design, in a manner timed to support the introduction of smart meters and to support other RCI options.
- Remove regulatory and financial barriers to natural gas utility investments in cost-effective conservation, so as to better align the interests of utilities and customers, and to support GHG emissions reduction goals set out in the Governor's Executive Order.
- **Timing:** As noted above.
- **Coverage of parties:** Washington Utilities and Transportation Commission, electric and gas utilities, and residential sector consumers.
- **Other:**

### Implementation Mechanisms

In addition to those noted in the "Policy Design" section above, potential implementation mechanisms for this option include:

- Modifying policies to align utility incentives with the delivery of cost-effective energy efficiency, and modify ratemaking practices to promote energy efficiency investments. Programs could be based on efforts in this area through the National Action Plan for Energy Efficiency<sup>18</sup>, the ACEEE Report: *Aligning Utility Interests with Energy Efficiency Objectives* described above, and related program models in California and Oregon.
- If the pilot "smart metering" program is successful, consider implementing meters statewide.
- Recommend the legislature propose a customer rebate program in future legislation.
- Implement a customer rebate program that gives customers a percentage rebate on bills if they are able to reduce their consumption by a certain percentage during certain periods of the year. (for example, by reducing use of natural gas in the winter to heat the home)
- Continue to improve on existing energy-efficient programs already implemented by the state.
- Consider implementing a policy that all new electricity meter installations (meters for new buildings) must be "smart meters", and for existing electric meters to be retrofitted to smart meters<sup>19</sup>.

<sup>18</sup> <http://www.epa.gov/cleanrgy/actionplan/eeactionplan.htm>

<sup>19</sup> As an example, it has been estimated that it would take a specific Washington utility 3 to 5 years to convert its 45,000 meters to an automated meter reading system with 2-way communications and a number of "smart metering" features. Ratepayers would pay about \$4 per month for 3-4 years to pay for the system, which would provide advantages including on-demand and remote meter reads, remote on/off control of the meter, improved outage management and system monitoring (optimized dispatch of power), web-based customer usage readouts, and tracking of power usage on a daily basis (to allow monitoring of problems and power spikes quickly).

- Education programs should be deployed that demonstrate the nexus between consumers' behavior and the impact on energy use and consequently, increases in GHG emissions.

### **Related Policies/Programs in Place**

In 2006, the Legislature passed the net metering law (HB 2352 - amending Chapter 80.60 RCW). The law directs large electric utilities to:

“... offer to make net metering available to eligible customers-generators on a first-come, first-served basis until the cumulative generating capacity of net metering systems equals 0.25 percent of the utility's peak demand during 1996. On January 1, 2014, the cumulative generating capacity available to net metering systems will equal 0.5 percent of the utility's peak demand during 1996. Not less than one-half of the utility's 1996 peak demand available for net metering systems shall be reserved for the cumulative generating capacity attributable to net metering systems that generate renewable energy.”

American Gas Association's (AGA) April 2007 “Rate Round Up” includes a summary of “innovative” rate programs across the country. Two natural gas utilities in Washington State are currently implementing [pilot] decoupling programs: Avista and Cascade Natural Gas. An excerpt from the AGA document follows:

#### **“Washington - Avista**

On February 1, 2007, Avista received approval from the Washington Utilities and Transportation Commission to implement a partial decoupling mechanism on a three-year pilot basis. The program, which does not include losses related to weather, will apply to residential and small commercial customers, and rate increases from the program will be capped at 2 percent per year. The company had recently completed a rate case when it filed its petition.

Avista is to defer 90 percent of the non-weather-related margin difference (positive or negative), which is to be recovered from or returned to customers. The recovery of any deferred costs is subject to both an earnings test that would prohibit collection if Avista is earning above its authorized 9.11 percent rate of return, and a demand-side management (DSM) test that would prohibit collection if specific conservation targets are not achieved. Funds not recovered due to the earnings and/or DSM tests may not be carried over to the next period. Also, the commission prohibits Avista from earning interest on deferrals until the deferrals are approved for recovery.

Avista must submit an evaluation of the mechanism and any proposed modifications if it wishes to continue the program after three years. The commission stated that the mechanism will be evaluated, and extension granted, only if there is a demonstration that the mechanism led to cost-effective enhanced conservation.”

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#### **Washington - Cascade Natural Gas**

On January 12, 2007, the Washington Utilities and Transportation Commission authorized Cascade Natural Gas to implement a partial decoupling mechanism on a pilot basis for a three-year period. The mechanism, which will apply to residential and general service commercial customers, would defer non-weather-related margin variances (e.g., changes in usage related to conservation and energy efficiency improvements). In connection with the decoupling mechanism, the settlement called for Cascade to submit a conservation plan, which would be filed after the settlement was approved and an advisory group was convened to review an outside consultant's assessment of the energy efficiency potential in the company's service territory. The settlement specified that the plan would contain targets and benchmarks based on recommendations from the advisory group, and opportunities for penalties and/or incentives. Cascade's program includes paying for customer incentives on rebates for cost-effective demand side management programs, such as high efficiency appliances, insulation and consumer education programs. The decoupling program will be subject to commission approval of a conservation plan, with earnings capped at the authorized 8.85 percent overall rate of return, and will include penalties for failure to meet conservation targets and benchmarks. The pilot program will be evaluated regardless of whether the company seeks to continue the program after the three-year period expires.

This case was a follow up to the company's previous proposal before the Washington commission. In May 2005, the commission issued a proposal to decouple utilities' gas volume sales from their recovery of fixed costs. As part of the proceeding, the commission considered a decoupling petition by Cascade Natural Gas that was outside of a rate case. The commission ultimately denied the petition and said that the issues were better considered within a rate case.

**<http://www.epa.state.il.us/air/climatechange/documents/subgroups/power-energy/aga-update-on-revenue-decoupling-mechanisms.pdf>**

State EE/RE Technical Forum: Decoupling and Other Mechanisms to Address Utility Disincentives for Implementing Energy Efficiency,  
[http://www.epa.gov/cleanenergy/pdf/keystone/Background\\_Decoupling\\_5-19-05\\_PQA\\_final.pdf](http://www.epa.gov/cleanenergy/pdf/keystone/Background_Decoupling_5-19-05_PQA_final.pdf)

The establishment of a policy to remove the disincentive for utility investments in energy efficiency was a key element of California's energy efficiency success.<sup>20</sup>

### **Type(s) of GHG Reductions**

GHG benefits will result predominantly from reduced CO<sub>2</sub> emissions from lower levels of natural gas combustion at end-user sites, and from reduced central-station fossil-fueled electricity generation caused by reduced end-user demand for electricity. Additional upstream CH<sub>4</sub> and CO<sub>2</sub> savings could occur due to incremental reduction in natural gas transmission, distribution, processing, and extraction activities.

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<sup>20</sup> Energy Efficiency in California and the United States. White Paper. Audrey B. Chang, Arthur H. Rosenfeld, and Patrick K. McAuliffe. 2007. Related presentations available at:  
[http://www.energy.ca.gov/commission/commissioners/rosenfeld\\_docs/index.html](http://www.energy.ca.gov/commission/commissioners/rosenfeld_docs/index.html)

## Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e

### Preliminary Results (for Smart Metering and Inverted Block Rate Elements)

	Policy	Reductions (MMtCO <sub>2</sub> e)			NPV (2008–2020) \$ millions	Cost-Effective-ness \$/tCO <sub>2</sub>
		2012	2020	Cumulative Reductions (2008–2020)		
RCI-5	Rate Structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues)	0.09	0.30	2.9	-\$152	-\$52

- Data Sources:**

Potential data sources for additional analysis include:

US EPA. Business Case for Energy Efficiency:

[http://www.epa.gov/cleanenergy/pdf/napee/napee\\_chap4.pdf](http://www.epa.gov/cleanenergy/pdf/napee/napee_chap4.pdf)

US EPA. Business Case Details:

[http://www.epa.gov/cleanenergy/pdf/napee/napee\\_appb.pdf](http://www.epa.gov/cleanenergy/pdf/napee/napee_appb.pdf)

National Association of Regulatory Utility Commissioners (NARUC): In 2006 and prior years, NARUC adopted several resolutions encouraging state and federal regulatory commissions to implement innovative rate designs, including energy-efficiency tariffs and decoupling tariffs, to promote energy efficiency and conservation.

- Quantification Methods:**

Most of the rate-structure-related elements of this option can be considered to be in support of other RCI (and in some cases ES) options, and furthermore the ability to quantify their impacts is somewhat limited, thus quantitative analysis might be unnecessary or infeasible for the TWG process. One element that might be suitable for quantification is tiered (increasing block) rate structure, for which some studies exist. Based on TWG assumptions about the relative pricing of different blocks, we could adapt parameters of existing studies, or possibly investigate econometric (elasticity-based) methods of estimating electricity and gas sales reductions. The impacts and costs of the “smart metering” element of this option can be estimated more directly, by assuming a ramp-in of a fixed number of (or a fraction of customers covered by) smart meters, and using existing studies to estimate a fractional energy use reduction by customers using the meters. *(Note that energy savings and emission reductions will likely overlap considerably with other RCI options; an integrated analysis of combined impacts will be undertaken at a later stage.)*

- Key Assumptions (preliminary -- see Annex for references and data sources see Annex)**

- This policy should be primarily directed at the Residential Sector.

- Assume some of the savings associated with RCI-1 may be contingent upon the potential of cost recovery by natural gas utilities.
- Smart meters in pilot program phased in over [3 years]
- Smart meters cost an average of [\$200 each]
- Smart meters induce savings of [8 percent] of projected consumption
- Inverted block tariffs apply to an additional [35 percent] of residential consumers. At present Avista, PacifiCorp, Puget Sound Energy, and Seattle City Light have strongly tiered residential rates, but other Washington utilities (investor-owned and public) appear not to<sup>21</sup>. The utilities currently without strongly tiered residential rates account for over 40 percent of Washington's residential customers.
- Inverted block tariffs induce savings of [4 percent] of projected consumption
- There is no significant incremental cost in implementing tariff changes

### Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

### Key Uncertainties

- Impact on low income people: Whatever policy options that are implemented need to be mindful of the impact on low income individuals. A raise in utility costs could be extremely disproportionate to this class of people. Moreover, low income families tend to use the most inefficient heating and cooling systems.
- Increasing Tier Block (Inverted block): could result in large bill increases for users that cannot change their usage level and could encourage more use by the smaller users. Additionally, commercial & residential facilities are not homogeneous and therefore, this approach does not work for commercial and industrial consumers.
- Smart Metering: recommend a study of this rate design option to ensure that the benefits justify the cost. For example, could monitor or study the program being considered by the Energy Trust of Oregon.

### Additional Benefits and Costs

- Reducing dependence on imported fuel sources;
- Reducing vulnerability to energy price spikes;
- Reducing peak demand and improving the utilization of the electricity system;

<sup>21</sup> As of approximately 2003, Steilacoom did have tiered rates, but as the rates increased by only a few percent per tier, these are not considered "strongly tiered".

- Reducing the risk of power shortages;
- Supporting local businesses and stimulating economic development;
- Enabling avoidance of the most controversial energy supply projects;
- Reducing water consumption by power plants; and
- Reducing pollutant emissions by power plants and improving public health.

**Feasibility Issues**

[Insert text here]

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD

### **RCI-6. Provide Incentives to Promote and Reduction of Barriers to Implementation of Renewable Energy Systems**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT as ES-2 during Sept 7 meeting

*Based on RCI Catalog Option 6.1*

*This option is being pursued jointly with the ES TWG, with the ES TWG taking the lead for option development and analysis. See the ES TWG documentation for the latest version.*

*Past RCI TWG input has been provided to the ES TWG, and RCI TWG members are welcome to provide input to the development of this option on an ongoing basis.*

### **RCI-7. Provide Incentives and Resources to Promote and Reduction of Barriers to Implementation of Combined Heat and Power (CHP, or “cogeneration”) and Waste Heat Capture, Including Net-metering for Combined Heat and Power**

**Straw Proposal Development Status:** Reviewed and affirmed as ES-7 by CAT during Sept 7 meeting

*Based on RCI Catalog Options 6.2 and 5.2*

*This option is being pursued jointly with the ES TWG, with the ES TWG taking the lead for option development and analysis. See the ES TWG documentation for the latest version.*

*Past RCI TWG input has been provided to the ES TWG, and RCI TWG members are welcome to provide input to the development of this option on an ongoing basis.*

## **RCI-8. Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Sept 7 meeting  
*Based on RCI Catalog Options 4.1 and 8.2*

### **Mitigation Option Description**

The ultimate effectiveness of emissions reduction activities in many cases depends on providing information and education to consumers regarding the energy and GHG emissions implications of consumer choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions in their personal and professional lives. Public education and outreach efforts should integrate with and build upon existing outreach efforts involving climate change and related issues in the state. Public education and outreach will be the foundation for the long-term success of all of the mitigation actions proposed by the Washington CAT, as well as those that may evolve in the future. Education and certification programs for professionals involved in delivering services in support of RCI and other policy options considered by the CAT must also be developed and implemented.

This option would additionally include elements to estimate the embodied life cycle energy use and carbon emissions associated with products and buildings, to label products and buildings being sold so as to provide feedback to consumers on their "carbon footprint", and to encourage the use of lower-carbon products and building materials.

### **Mitigation Option Design**

Potential elements of this option could include:

- Coordinating climate and energy efficiency education programs throughout the state, including education and energy-efficiency programs offered by utilities.
- Implementing requirements for retail education (on packaging or on a handout provided at the time of purchase), that will inform consumers about the energy consumption of the products and materials (including building materials) they buy, and how to operate or use products in the most energy-efficient manner. These requirements should take advantage of and build upon existing Energy Star initiatives and certification programs, and be implemented in coordination with retail sales organizations where applicable.
- Engaging industrial firms to promote LEAN manufacturing techniques and other practices to reduce unnecessary energy and material consumption, and engaging small businesses on GHG emissions reduction by using environmental impacts education materials.
- Enhancing the coverage of energy and environmental issues, including climate change, in public school curricula at all levels to shape long-term behavior.



- Work with community colleges, universities, labor organizations, governments, business organizations, and businesses to promote the development of programs for training of a much expanded “clean energy workforce” to work in fields like energy efficiency, distributed and renewable energy, and the “green building” (see below) trades.
- As noted in RCI-3, there is a need to provide suitably trained building professionals with “green building” certification so that potential purchasers and developers of green buildings can be assured that builders and designers so designated are equipped to produce green buildings, and building code enforcement officials have suitable training to apply advanced building energy codes. A preliminary step here would be to adapt, adopt, and/or develop a suitable set of qualifications that building professionals must meet to receive a green building certification. Certification programs should be offered for both individual builders and designers and for contracting and design companies, though specific rules will need to be developed for certified companies to assure that the individuals within a company who work on a given green building project are properly trained to do so. Ultimately, building energy efficiency qualifications should be built into requirements for receiving licenses in building-related professions, and certification programs should build toward this goal.
- Consider and evaluate “carbon labeling” of products, and how this might be done in a consistent and verifiable manner, possibly on a regional (e.g. Western Climate Initiative) or federal level. A labeling scheme would indicate to the consumer the total embodied carbon emitted during the life cycle of a particular product (including the product and the packaging). Life cycle analysis should consider the direct emissions including the phases of production: raw material, product manufacturing, distribution and retail, consumer use (is it refrigerated, etc), and recycling. The life-cycle analysis would determine the total amount of carbon emitted during the creation and use of the product and that number would be put on the carbon label. This label would also indicate that the company has made a commitment to reducing the carbon footprint of the specific product over the course of two years. This type of labeling would inform consumers about the embodied carbon footprint of a particular product, giving them the opportunity to influence corporate practices through their buying power. Companies participating in the program would also be able to show that they are committed to reducing their carbon footprint and to mitigating climate change. Carbon footprint labeling could coordinate with programs related to disclosure of building energy use when a building is offered for lease or sale (as suggested in RCI-4)<sup>22</sup>. Pilot programs to gauge the impacts of labeling on consumer behavior may be a useful first step in developing labeling systems, with effective programs subsequently implemented broadly.
- **Goals:** Consumer, K-12, and technical/professional education course should be developed so as to provide timely support to other options recommended by the CAT, and to support the GHG emissions reduction goals set out in the Governor’s Executive

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<sup>22</sup> See “Related Programs/Policies in Place”, below, for references to carbon labeling programs being investigated elsewhere.

Order. The carbon labeling initiative described above would cover all products sold within Washington State.

- **Timing:** For the carbon labeling program, full implementation by 2020 with phased implementation starting with highest priority items identified by an advisory panel.
- **Coverage of parties:** Consumers, Retailers, Manufacturers, Government Agencies, K-12 Public Schools, Community Colleges, Universities, Technicians and Professionals in Building and related trades.
- **Other:**

### Implementation Mechanisms

In addition to the actions noted above, potential implementation mechanisms for this option include:

- A consumer education requirement at the time of sale for key products.
- Labeling of building materials in reference to CORRIM study<sup>23</sup> and LCA<sup>24</sup> work.
- Providing tools and information for residents, businesses and communities to perform GHG inventories, and to evaluate and act upon inventory results.
- Expanding climate involvement and participation within communities.
- Developing programs to have state agencies/local governments promote improvements within small business sectors and trade associations by using existing models for business education of environmental impacts.
- Convene an advisory panel to help in developing carbon labeling standards and protocols.

### Related Policies/Programs in Place

#### Carbon Labeling

The UK is implementing a program of carbon labeling through the UK Climate Trust. The methodology for determining the carbon footprint of each product can be found here: [http://www.carbontrust.co.uk/NR/rdonlyres/6DEA1490-254B-434F-B2B2-21D93F0B0C98/0/Methodology\\_summary.pdf](http://www.carbontrust.co.uk/NR/rdonlyres/6DEA1490-254B-434F-B2B2-21D93F0B0C98/0/Methodology_summary.pdf). The development of carbon labeling programs for various products is also underway in Oregon and Connecticut, including labeling programs for automobiles.

#### Building and Builder Certification

[Text describing ongoing programs in the building and building professional certification areas, including classes offered by the National Association of Homebuilders, is to be provided.]

<sup>23</sup> [http://www.corrim.org/reports/2006/fpj\\_oct\\_2006/FPJproductSubs.pdf](http://www.corrim.org/reports/2006/fpj_oct_2006/FPJproductSubs.pdf)

<sup>24</sup> <http://www.epa.gov/ORD/NRMRL/lcaccess/>

**Type(s) of GHG Reductions**

This option supports the reductions in GHG emissions at the end-user and power plant level noted for RCI-1, RCI-3 through RCI-5, and other RCI options.

**Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e**

- **Data Sources:**
  - Analysis on carbon labeling programs being developed/implemented in Oregon and Connecticut.
- **Quantification Methods:**

The elements of this option support other RCI options and options being developed by other TWGs. As it is difficult, however, to ascribe specific and direct GHG savings to the elements included in this option, the savings and costs of this option will not be separately quantified.
- **Key Assumptions:**

**Contribution to Other Goals**

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
  - Significant potential for long term GHG reduction savings
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

**Key Uncertainties**

[Insert text here]

**Additional Benefits and Costs**

[Insert text here]

**Feasibility Issues**

[Insert text here]

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD

## **RCI-9. Identify GHG Emissions Impacts and Measures to Avoid, Minimize, or Mitigate them for Projects Requiring Government Review, and in Designing Government Rules and Regulations**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Sept 7 meeting

*Based on RCI Catalog Options 7.7 and 7.8*

### **Mitigation Option Description**

In 1997, then chairman of the Council for Environmental Quality, Kathleen McGinty drafted an interpretation of NEPA for federal agency heads finding that NEPA provides an ‘appropriate and feasible mechanism for considering climate change drivers and consequences.’<sup>25</sup> The option described below would require identification of the net impacts on GHG emissions of new government rules and regulations, and would require the identification measures to avoid, minimize or mitigate increases in emissions due to the implementation of those rules and regulations in order to prevent the unintended consequences (such as increasing GHG emissions). This option would additionally require SEPA (State Environmental Policy Act) review to quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for state-funded and/or privately funded projects, and would emphasize the incorporation of GHG emissions consideration in community planning and zoning decisions. Efficient community planning holds perhaps the greatest potential for future reductions of any mitigation strategy.

### **Mitigation Option Design**

Potential elements of this option could include:

- Requiring SEPA review to quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for projects requiring government review. [During its September 7 meeting, the CAT suggested that the TWG revise the text to reflect that SEPA already includes the authority to include GHG emissions as criteria in environmental reviews, and that the TWG focus on providing guidance as to how reviews of the impacts of projects on GHG emissions should be done under SEPA.]
- GHG emissions impact review requirements for significant development projects modeled after the program in place in Massachusetts, in which private developers are required to estimate the greenhouse gases their large-scale projects will produce and reduce them with measures such as energy-efficient lighting, alternative fuels, or

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<sup>25</sup> McGinty, K.A., 1997. Draft memorandum: Guidance regarding consideration of global climatic change in environmental documents prepared pursuant to the National Environmental Policy Act. *Council for Environmental Quality*.

commuter shuttles. Large housing developments, office projects, and mixed-use developments that combine retail, industrial, and residential uses will be affected.<sup>26</sup>

- Covered projects could include:
  - All state-funded or proposed projects
  - Privately-funded projects that require a state air quality permit
  - Privately-funded projects that result in more than 3000 vehicle-mile trips/year.
- A review of the energy intensity of the production of building materials used in projects, in order to provide incentives for use of low greenhouse gas building products.
- Requirements that all new projects reduce GHG emissions, with true mitigation of emissions preferred over off-site mitigation or offsets.
- A requirement that all government actions be reviewed for potential GHG impacts, with the review process designed to be efficient and low-cost.
- Add climate protection as a required element of local planning under the state Growth Management Act. It is much more efficient to consider climate impacts at the level of community planning, when synergies between land use, transport, and building energy use can best be identified and addressed, than at the level of individual projects, though the latter is important as well. Therefore, emphasis on incorporating evaluation of GHG emissions impacts in comprehensive zoning processes is a critical step in achieving significant emissions reductions. This element should be integrated/coordinated with similar initiative being considered by the Transport TWG and included in other RCI options
- **Goals:** Establish information disclosure requirements and data collection capacities enabling the state to quantify the impact of development on statewide GHG reduction targets to inform subsequent mitigation thresholds and target setting.
- **Timing:** King County's two-phase model, which requires a year of information disclosure and data collection prior to developing specific mitigation thresholds and targets, has great potential for replication statewide.
- **Coverage of parties:** Government agencies, municipal and county planners and zoning boards, private developers of substantial projects.
- **Other:**

### Implementation Mechanisms

Possible implementation mechanisms for elements of this option include:

#### Climate Protection as a Required Element of Local Planning

- Provide funding/support for local governments to include greenhouse gas emissions considerations in local planning and zoning processes

<sup>26</sup> Massachusetts guidelines were scheduled for completion on July 1. See [http://www.boston.com/news/local/articles/2007/04/22/mass\\_steps\\_up\\_climate\\_rules\\_for\\_developers/](http://www.boston.com/news/local/articles/2007/04/22/mass_steps_up_climate_rules_for_developers/)

- Provide guidance and training for local governments to enable them to effectively evaluate GHG emissions impacts of planning and zoning decisions.
- Add enforcement capabilities to State-level review of local plans, so as to assure that local plans are consistent with statewide climate strategies.

### Related Policies/Programs in Place

#### SEPA

King County is currently undertaking these kinds of reviews of the GHG emissions implications of projects. *[CAT member Jim Lopez invited the TWG to correspond with his office for more information on this program]*

King County Executive Ron Sims announced in June of this year new county policy to track greenhouse gas impacts of development projects within county borders. County staff are currently developing an accounting methodology to quantify carbon impact for projects undergoing SEPA review, with the intent to have requirements in place by fall of this year (asking for carbon emissions from proposed development). This “first tier” will not set thresholds or require that developers identify or conduct mitigation, but is simply disclosure or information gathering.

The second tier of this policy will engage the County Council through the 2008 Comprehensive Plan Update. County Staff plan to include policy reaffirming the County’s substantive authority to require GHG mitigation for projects meeting some threshold (as yet undefined) of climate impact, with the hope of implementation in early 2009.

The Puget Sound Clean Air Agency has the authority to conduct SEPA review of projects with GHG emissions impacts. **[NEED MORE INFORMATION ON STATUS]** City of Seattle neighborhood planning processes are also beginning to consider the impacts of those processes on climate.

California’s Attorney General brought a lawsuit against San Bernardino County, CA in April 2007, and just settled August 21:

“The agreement, approved ... by the County Board of Supervisors, establishes a unique greenhouse gas reduction plan that will identify sources of emissions and set feasible reduction targets for the County.

Under [the] agreement, the County will embark upon a thirty month public process aimed at cutting greenhouse gas emissions attributable to land use decisions and County government operations. The Greenhouse Gas Emissions Reduction Plan mandates the following:

- An inventory of all known, or reasonably discoverable, sources of greenhouse gases in the County.
- An inventory of the greenhouse gas emissions level in 1990, currently, and that projected for the year 2020.

- A target for the reduction of emissions attributable to the county's discretionary land use decisions and its own internal government operations."<sup>27, 28</sup>
- Internationally, the Clinton Climate Initiative's C40 Climate Leadership Group includes and emphasis on community planning for reduced GHG emissions.<sup>29</sup>

### Type(s) of GHG Reductions

[Insert text here]

### Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e

- **Data Sources:**

Potential data sources for additional analysis include:

Research in California, NYC and elsewhere has begun to quantify the impact of changes in community planning on GHG emissions. California estimates 10-15% of potential statewide reductions can be achieved through land use planning changes. New York City is estimating 15.6 million metric tons will be reduced through smart growth planning and design (accounting to approximately 30% of the City's total reduction strategy). Specific data sources associated with initiatives in other parts of the US are provided below.

**PlaNYC:** New York City PlaNYC 2030 estimates that attracting 900,000 new residents by 2030 will result in an avoided 15.6 million metric tons of CO<sub>2</sub>e through avoided sprawl.<sup>30</sup> Methodology is not immediately apparent from the report but should be available through the New York City Office of Long Term Planning and Sustainability.

**Center for Clean Air Policy (CCAP):** CCAP is working with the State of California (through the Land Use subgroup of their CAT process) to quantify benefits of land use decisions.<sup>31</sup>

**Massachusetts:** Methodology under development by Massachusetts Department of Environmental Affairs (expected completion July 1, 2007 – uncertain of status).<sup>32</sup>

**San Bernardino County:** Very recent settlement with CA Attorney General's Office requires that County establishes targets for reducing sources of emissions "reasonably attributable to the County's discretionary land use decisions and the county's internal government operations..."<sup>33</sup>

<sup>27</sup> California Attorney General Press Release, "Brown Announces Landmark Global Warming Settlement," August 21, 2007, <http://ag.ca.gov/newsalerts/release.php?id=1453>

<sup>28</sup> San Bernardino Settlement Agreement, August 21, 2007, [http://ag.ca.gov/cms\\_pdfs/press/2007-08-21\\_San\\_Bernardino\\_settlement\\_agreement.pdf](http://ag.ca.gov/cms_pdfs/press/2007-08-21_San_Bernardino_settlement_agreement.pdf)

<sup>29</sup> See, for example, <http://www.c40cities.org/>.

<sup>30</sup> [http://www.nyc.gov/html/planyc2030/downloads/pdf/report\\_climate\\_change.pdf](http://www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf)

<sup>31</sup> <http://www.ccap.org/domestic/state.htm>

<sup>32</sup> <http://www.mass.gov/envir/>

<sup>33</sup> San Bernardino Settlement Agreement, August 21, 2007, [http://ag.ca.gov/cms\\_pdfs/press/2007-08-21\\_San\\_Bernardino\\_settlement\\_agreement.pdf](http://ag.ca.gov/cms_pdfs/press/2007-08-21_San_Bernardino_settlement_agreement.pdf)



**CCAR:** In the process of developing a local government protocol for measurement, would likely attempt to quantify some of the impacts associated with development patterns. White paper available late fall, Protocol target completion date: Summer 2008.

- **Quantification Methods:**

Proposed Quantification Approach: As with RCI-8, the elements of this option support other RCI options and to options being developed by other TWGs. Given that the goals of this option are focused on information gathering and provision, it is difficult to ascribe direct emissions impacts to this option (though it would help to bring about the savings achieved in RCI-3, for example). Therefore it is proposed that the costs and impacts of this option not be quantified.

- **Key Assumptions:**

#### Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
  - Significant potential to increase consultant and government jobs.
- **Reduced Fuel Import Expenditures:**

#### Key Uncertainties

[Insert text here]

#### Additional Benefits and Costs

[Insert text here]

#### Feasibility Issues

[Insert text here]

#### Status of Group Approval

TBD

#### Level of Group Support

TBD

#### Barriers to Consensus

TBD

## **RCI-10. More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design**

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Sept 7 meeting

*Based on RCI Catalog Options 3.1 and 8.1*

### **Mitigation Option Description**

This option is designed to advance policies and programs that result in improved life-cycle benefits of new lighting, equipment, appliances and consumer electronic products, that is, through increasing energy efficiency while also increasing product recycling and reuse and avoiding the generation of solid waste and the production and emissions of toxic materials.

Washington is one of 10 states that have standards for minimum energy efficiencies for specific products not covered by federal standards, or that go beyond federal standards. State standards fill gaps left by the federal government or encourage the adoption by manufacturers and others of higher standards than current federal standards. Regional co-ordination for state appliance/equipment/lighting standards can be used to avoid concerns that retailers or manufacturers may (1) resist supplying equipment to one state that has advanced standards or (2) focus sales of lower efficiency models on a state with less stringent efficiency standards.

While there has been substantial progress in improving the energy efficiency of some consumer and commercial products, substantial energy conservation potential remains in products such as lighting, computers, servers and televisions. And equally important to moving the consumer electronic product industry to increased energy efficiency is to reduce the life-cycle environmental and economic impacts of the next generation of lighting, appliances and other electronic and electrical equipment.

The overall goal this option is to reduce the life-cycle greenhouse gas (and other) emissions “footprint” of products and their packaging. Additional benefits include reduction of non-GHG pollutants, savings of materials. This option would include appliance and lighting products recycling; design issues including inclusion in products of “smart chips”, design of products to make them easy to recycle, and designs to improve product longevity.

### **Mitigation Option Design**

Potential elements of this option could include:

- Develop and implement minimum efficiency standards for televisions<sup>34</sup>, digital TV adapters and other consumer electronic goods, working with US DOE or other parties.

<sup>34</sup> Already, televisions account for about 4 percent of annual residential electricity use in the United States. By 2009, when half of all new TV sales are expected to be extended- or high-definition digital sets with big screens, according to NRDC, TV energy use will be about 50 percent higher than at present. Further, the move to high-definition TV requires sets to deliver more picture clarity, which uses more power. In addition, nationally it is anticipated that millions of old analog televisions will be no longer wanted and will need to be recycled. Using the

- Task CTED with analyzing the potential to apply efficiency standards to include lighting products. California is currently considering legislation requiring minimum lumen/watt standards for different categories of lighting as well as setting standards for reducing indoor residential lighting energy usage by no less than 50%, by 2018, as well as requiring a 25% reduction in commercial facilities by that same date.
- Task CTED to review and analyze efficiency standards already adopted by California (products not covered by federal standards) for application in Washington including walk-in refrigerators and freezers, residential furnaces, dry-type transformers, commercial hot-food holding cabinets and other electronic and electrical equipment.
- Require manufacturers to reduce the levels of toxins in lighting products, such as mercury in fluorescents, consistent with requirements already in place in the European Union.
- Require manufacturers to have an effective system in place for collecting and recycling end-of-life bulbs that contain hazardous materials that is easy and convenient for the consumer<sup>35</sup>. This can be done by including the cost of collection and recycling in the purchase price of the product and by working with retailers, recyclers, utilities, local governments and others to provide convenient collection opportunities. Manufacturer-designed and -financed systems would ensure the most efficient and effective collection programs.
- Concurrent with policies and programs to ensure safe recycling and/or disposal of lighting products that contain lead and mercury, phase out incandescent lighting and set a date for a ban on them (with appropriate exemptions such as surgeries.)
- With state, utility and private sector financial support, invest in research and development initiatives or incentive programs to accelerate the use of LED (light-emitting diode) and other least toxic, highly-efficient lighting technologies in all sectors.
- Require the preferential procurement of EnergyStar™ products if available (equipment, appliance or technology) if state funds are involved (e.g., state purchasing contracts, state grants or loans, etc.)
- Create state tax incentives to increase sales and use of EnergyStar™ appliances and equipment.
- Work with manufacturers, retailers, recyclers and energy and solid waste utilities to ensure that all program elements promote and incorporate the recycling and/or materials reuse of old products (including increasing the recycled materials use in manufacturing new products), and to implement lower-energy manufacturing processes. Energy efficient product promotional programs should be planned and coupled with corresponding recycling

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best available technology, however, could reduce this new generation of big-screen TV "active mode" consumption by at least 25 percent, saving 10 billion kilowatt-hours per year, the NRDC estimates. In addition to chopping residential electric bills by \$1 billion, it would prevent 7 million extra tons of carbon dioxide from entering the atmosphere, according to NRDC.

<sup>35</sup> For example, transitioning from incandescent lighting to CFLs in the residential sector offers enormous energy savings potential, but the fact that there is no comprehensive and effective system in place for recycling or disposing of old CFLs to avoid mercury contamination creates a barrier to achieving the full potential of CFLs.

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programs for the old products and new products being promoted. Also consider encouraging manufacturers to design product/packaging for use as clean fuel if not reused or recycled.

- Substantially increase the use of green electronic products and reduce solid waste by promoting EPEAT™ through a consortium of state, local government and business procurement entities, and require the use of EPEAT in state and local government procurement<sup>36</sup>.

To achieve economies of scale and market efficiency, many of the most promising mitigation options would be most effective if planned and developed regionally, through, for example, the Western Climate Initiative. That said, however, it is important for Washington and other individual states to press forward with new appliance/equipment/lighting efficiency standards, and with related standards for the environmental impacts of products, as doing so will accelerate the move toward higher regional and national standards, and will play a key role in educating consumers.

- **Goals:**
  - Consistent with an option *under consideration by the Agriculture/Waste TWG* (AW-3), the recycling/collection goal should be 50% at a minimum; the capture rate for toxic, banned or highly recyclable products should be higher; ultimately, the state's interest should be 100% capture rate for these products.
  - The energy savings goal for improved lighting efficiency is 50% in the residential sector and 25% in the commercial sector.
  - Goals for the other products should be set based on an analysis of the baseline energy use and conservation potential, except for TVs.
  - The goal for TVs should be to improve energy use efficiency of the new generation of TVs by 25%.
- **Timing:** To be determined. Implement analyses noted above by 20XX; design additional efficiency standards by 20YY and implement by 20ZZ; begin implementing coordination on recycling and take-back programs in 20XX.
- **Coverage of parties:** Consumers, Manufacturers, Retailers, Solid Waste Agencies, other State Government Agencies
- **Other:**

### Implementation Mechanisms

In addition to the design elements noted above, possible implementation mechanisms for elements of this option include:

- *Appliance/equipment/lighting efficiency standards can be implemented at the state level for appliances and other devices not covered by federal standards, or where higher-than-federal standard efficiency requirements are appropriate<sup>37</sup>.*

<sup>36</sup> EPEAT is The Electronic Product Environmental Assessment Tool—see, for example, <http://www.epeat.net/>.

<sup>37</sup> In recent years, Arizona, Oregon, and Washington, among other states, adopted state standards for several appliances; this led to the inclusion of standards for these appliances in the 2005 federal Energy bill.

- Consideration of potential shifts in the use of toxic materials (such as mercury in fluorescent lamps) that could inhibit consumer demand for the efficient appliances and create costly disposal issues. For example, efficiency standards policies could be linked to manufacturer “takeback” requirements, toxics reduction standards, or incentives for development and use of non-toxic technologies.
- Consideration of “waste-to-fuel” issues in product and packaging design, with the goal of reducing the life-cycle greenhouse gas (and other) emissions “footprint” of products and their packaging by assuring that the product/packaging can be easily converted to a clean-burning fuel (if not reused or recycled) by eliminating impurities.
- Substantially increase the use of green electronic products and reduce solid waste by promoting EPEAT™ through a consortium of state, local government and business procurement entities. EPEAT (*The Electronic Product Environmental Assessment Tool*—see, for example, <http://www.epeat.net/>) is a procurement tool and system in which manufacturers declare their products’ conformance to a comprehensive set of environmental criteria in eight environmental performance categories including reduction/elimination of environmentally sensitive materials, material selection, design for end of life, product longevity/life cycle extension, energy efficiency, packaging and corporate performance. Provide state funding to promote EPEAT.
- Provide incentives for manufacturers to improvement the energy efficiency of products, the efficiency with which products can be produced, and the degree to which products can be recycled.
- Consider the impact of the standards and requirements included in this option on lower-income groups, and consider ways to mitigate those impacts.
- [During the September 7 CAT meeting, CTED staff recommended considering the implications of the Federal Energy Bill appliance standards on the implementation mechanisms of this policy option.]

#### Related Policies/Programs in Place

- State and federal appliance standards passed since 2005 will produce about 0.08 MMtCO<sub>2</sub>e of GHG emissions savings toward Washington’s 2020 target. The 2005 Legislature adopted minimum efficiency standards for 12 products (four of which were subsequently supplanted by 2005 federal standards.)<sup>38</sup>
- In 2005 the Washington Legislature adopted minimum efficiency standards for 12 products (RCW 19.260.040). State standards for four of these products were eliminated in 2006 legislation after stricter federal standards were established for those products. 2006 legislation established minimum efficiency standards for 8 types of commercial appliances, heating/cooling and lighting equipment sold within the State

<sup>38</sup> The National Energy Policy Act of 2005 set new standards on 16 products, such as exit signs, compact fluorescent light bulbs and other products. And, at this writing, federal legislation under consideration will result in new efficiency standards for refrigerators, dishwashers, washing machines and dehumidifiers.

- CTED is authorized by statute to update and recommend standards not covered by federal standards under the following conditions: if the alternative products are being produced, are cost effective, have equal or improved utility, and if the standards already exist in at least 2 states.
- **Electronic Product Recycling Program:** The Washington State Legislature passed legislation in 2006 requiring the manufacturers of televisions, computers, laptops and monitors to establish and finance a system throughout the state for the collection and recycling of those products by January 1, 2009.
- **Washington State Environmentally Preferable Purchasing Policies:** The State of Washington has a broad legislative and policy mandate for environmentally preferable purchasing activities by state agencies. This mandate is articulated in state executive orders, laws and rules. A list of key environmentally preferable purchasing executive orders, laws and rules for state agencies is below.
  - Executive Order 02-03, Sustainable Practices by State Agencies calls for each state agency to establish sustainability objectives and modify their purchasing practices in order to:
    - minimize energy and water use
    - shift to clean energy for both facilities and vehicles
    - shift to non-toxic, recycled and remanufactured materials in purchasing and construction
    - expand markets for environmentally preferable products and services
    - reduce and eliminate waste
  - Executive Order 05-01, Establishing Sustainability and Efficiency Goals for State Operations directs state agencies to achieve specific sustainability goals and required actions:
    - incorporate green building practices based on Leadership in Energy and Environmental Design (LEED) standards into new building construction and major remodeling projects
    - achieve a target of 20% reduction in petroleum use in the operation of state vehicles by 2009
    - employ professional vehicle fleet management practices to achieve more fuel efficient and low emission agency fleets
    - significantly reduce office paper purchases by 30%, increase the purchase of environmentally preferable paper to at least 50%, recycle all used office paper, and increase the purchase of post-consumer recycled janitorial products
    - reduce energy purchases by 10% from FY 2003 to 2009
  - Executive Order 04-01, Persistent Toxic Chemicals, directs state agencies to take steps to reduce persistent toxic chemicals in Washington State's environment.

- General Administration (GA) is to make available for purchase products that do not contain persistent toxic chemicals. If such products are not available, products with the least amount of persistent toxic chemicals shall be made available.
  - Each state agency is to adopt measures to reduce purchase of goods that contain persistent toxic chemicals. Agencies are directed to report annually on progress in meeting these measures.
  - Department of Ecology is to establish through rules, specific criteria for use in identifying persistent toxic chemicals.
- Executive Order 07-02 Washington Climate Change Challenge establishes the goal of reducing greenhouse gas emission in the state of Washington to: 1990 levels by 2020 and to 25% below 1990 levels by 2035.
  - RCW 43.19 GA's enabling legislation, provides a broad legislative basis for state purchases of recycled content and energy saving products. It also provides the flexibility to allow GA to award state contracts based on environmental considerations. It establishes that factors beyond price, including past performance and life cycle costing, are to be used in determining the "lowest responsible bidder."
  - RCW 43.19A includes goals requirements to increase the purchase and use of recycled content products. RCW 43.19.530A requires a chain of custody record that documents to whom the products were initially delivered through to the end use manufacturer.
  - Chapter 39.35D RCW High-performance public buildings, State-owned buildings and schools shall adopt recognized standards for high-performance public buildings and allowing flexible methods and choices in how to achieve those standards. Public agencies and school districts shall document costs and savings to monitor this program and ensure that economic, community, and environmental goals are achieved each year.
  - Chapter 70.95M RCW The Mercury Education Reduction Act (MERA) mandates General Administration to give priority and preference to the purchase of equipment, supplies, and other products that contain no mercury-added compounds or components.

### Type(s) of GHG Reductions

[Insert text here]

### Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e

- **Data Sources:**
- **Quantification Methods:**

Proposed Quantification Approach: Focus on the appliances/equipment/lighting standards element of this option by estimating the fractional energy (electricity and gas) savings, or



GHG savings achieved in other ways, relative to standard practice or federal standards, from implementing new standards in WA. Ideally, we will use existing studies of a batch of new standards, improvements, perhaps augmented by consideration of standards for additional devices that the TWG wants to consider separately, to estimate the energy/GHG savings and costs of the standards, and apply the savings and costs to either estimates of the fraction of energy demand addressed by the new devices, or to estimates of the number of new devices sold in WA.

- **Key Assumptions:**

**Contribution to Other Goals**

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

**Key Uncertainties**

[Insert text here]

**Additional Benefits and Costs**

[Insert text here]

**Feasibility Issues**

[Insert text here]

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD

## RCI-11. Policies and/or Programs Specifically Targeting Non-energy GHG Emissions

**Straw Proposal Development Status:** Reviewed and affirmed by CAT during Sept 7 meeting

*Based on RCI Catalog Option 7.4*

### Mitigation Option Description

GHG emissions from RCI sources not directly associated with energy use are emitted in relatively small quantities but have proportionately much larger impacts on climate. The potency of sources are measured by a global warming potential (GWP), - a measure of the potential impact of different gases on climate in terms of CO<sub>2</sub>-equivalent. Below is a chart that shows the GWP for frequently-emitted GHGs.

Greenhouse gas	Global Warming Potential (relative to CO <sub>2</sub> )
Carbon dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	23
Nitrous oxide	296
Hydrofluorocarbons (HFCs)	120 -12,000
Perfluorocarbons (PFCs)	5,700 – 11,900
Sulfur hexafluoride (SF <sub>6</sub> )	22,200

Third Annual Assessment, IPCC 2001

A combination of voluntary agreements with industries and of new specifications for key equipment can be used to reduce the emissions of process gases that have high global warming potentials.

### Mitigation Option Design

The sources of GHG emissions not directly associated with energy use generally fall into five categories:

- CO<sub>2</sub> from non-fossil fuel combustion sources. One percent of Washington's CO<sub>2</sub> emissions come from the non-energy aspects of aluminum and cement production.
- Methane (CH<sub>4</sub>) from landfills, coalmines, oil and gas operations and agriculture accounts for less than 3% of Washington's emissions currently, but are projected to increase slightly (less than 1 MMtCO<sub>2</sub>e from 2005 to 2020.) Mitigation policies addressing CH<sub>4</sub> are addressed by the Agriculture TWG.
- Agricultural activities such as manure management, fertilizer use, and livestock (enteric fermentation) result in methane and nitrous oxide emissions that account for 6% of State GHG emissions in 2005. These emissions are projected to decrease by about 0.6 MMtCO<sub>2</sub>e. Mitigation strategies are addressed in the Agriculture and Waste TWG.
- Hydrofluorocarbon (HFCs) and perfluorocompounds (PFCs) also known as Ozone

Depleting Substitutes (ODS), are potent greenhouse gases that comprise a small but growing source of GHG emissions in Washington state and nationally. ODS are used in refrigeration, air conditioning and in heat pumps. "Even low amounts of HFC and PFC emissions, for example, from leaks and other releases associated with normal use of the products, can lead to high GHG emissions on a carbon-equivalent basis." Washington's ODS emissions are expected to increase at an average rate of 6.1 percent per year from 2000 to 2020. The GWP of HFC-134a, one example of a HFC is 16,500 times more potent than CO<sub>2</sub> over a 100-year period.

- Sulfur hexafluoride (SF<sub>6</sub>) is a GHG used for insulation in the electricity industry and is emitted mostly when electric power transmission and distribution systems malfunction. According to the Intergovernmental Panel on Climate Change, SF<sub>6</sub> is the most potent greenhouse gas ever evaluated. It has a global warming potential of **22,200 times CO<sub>2</sub> over a 100-year period**. SF<sub>6</sub> emissions have declined because of voluntary industry action in the 1990s. A continuing decline will depend on continued efforts of the electric industry to reduce these emissions.

The mitigation options for this policy span across different sectors and industries. A combination of voluntary reduction, requirements for key equipment, education campaigns, performance standards, and prescriptive measures can be used. Reduction strategies are divided by the industry and source targeted for mitigation.

#### Aluminum and Cement Production

The cement and aluminum industry are the highest emitters of non-energy CO<sub>2</sub>. Large quantities of CO<sub>2</sub> are emitted during the production of lime, the key ingredient in cement. GHG emissions from these industries can be reduced in various ways, and can make a large dent in overall CO<sub>2</sub> reduction. Options for reducing emissions in the cement industry, for example, are inclusion of fly ash in cement, and use of innovative low-GHG cement fillers. Key elements of this option include:

- **Goals:** Reduce CO<sub>2</sub> emissions by the cement and aluminum industries. A 10 percent reduction in CO<sub>2</sub> emissions per ton of cementitious product produced or sold from a 1990 baseline by 2020.
- **Timing:** Implement policy in a reasonable timeframe to allow timely reductions.
- **Coverage of parties:** All industrial sources currently monitored by the GHG inventory, and emit over 100,000 metric tons of CO<sub>2</sub>e, are covered by this mitigation option.
- **Other:**

#### HFCs and PFCs

Efforts to reduce the use of ODS products are necessary to decrease the potential growth of the powerful greenhouse gases. Refrigeration and mobile air conditioning (MAC) release the highest amounts of ODS. HFCs are also found in compressed gas computer keyboard canisters, which are 100% HFC-134a, and in novelty aerosols such as silly string. Key elements of state action should include:

- Overall provisions

- Provisions for Mobile Air Conditioning
- Provisions for refrigeration, air condition and heat pump equipment
  - **Goals:** Reduce the use of HFCs and PFCs
  - **Timing:** Implement policy in a reasonable timeframe to allow timely reductions.
  - **Coverage of parties:** Individuals and industry are both covered in this mitigation strategy.
- **Other:**

### Implementation Mechanisms

In addition to the design elements noted above, possible implementation mechanisms for elements of this option include:

Cement Production: In addition to measures that reduce fossil fuel energy use per unit of production in RCI-2, the following are recommended:

- Work with the cement industry to promote the development of cement-production techniques that require a lower proportion of calcined materials, thereby reducing CO<sub>2</sub> emissions per unit of product.
- Ensure that State construction specifications (DOT, GSA, etc) support the U.S. cement industry's support for changes to the standard recipe for Portland cement developed by the American Society for Testing and Materials (ASTM) to allow intergrinding some uncalcined limestone into the finished product to reduce the proportion of clinker in the finished product. Acceptance of such a change would result in a significant reduction of CO<sub>2</sub> emissions per unit of cement.
- Ensure that state procurement officials and policies support the harmonization of ASTM and AASHTO Cement Standards<sup>39</sup>
- Develop state procurement standards to increase use of climate friendly cement.
- Promote the life-cycle benefits of concrete use to architects, builders, state and federal procurement officials.
- Consider tax benefits and other incentives for applications of concrete products for paving and building that demonstrate positive life-cycle attributes.
- Participate in ongoing programs such as the U.S. Green Building Council, DOE's Industrial Technologies Program, and ENERGY STAR.
- Support for DOT and other government agencies' adoption of performance standards as an alternative to more prescriptive standards where applicable--for example, for building materials production processes that emit carbon, base emissions standards on the structural capacity of a product, rather than its mass alone—so manufacturers have the

<sup>39</sup> Some states use a Portland cement standard developed by the American Association of State Highway Transportation Organizations, rather than the ASTM standard. After the ASTM standard is improved, the AASHTO standard should be changed to conform.

flexibility to shift to more low-energy products and encourage substitution. This could include using blast-furnace slag *as* an alternative input in road construction.

- Requirements that cement users (or contractors working under building permits) have a certain percentage of fly ash or other material in the concrete they pour. This reduces the amount of cement used.
- Financial and/or market incentives to change the way cement is made (for example, where appropriate to switch to environmentally innovative fillers such as sewage).

### HFCs and PFCs

- Restrict the use of ODS in situations where viable alternatives are available.
- Use a combination of consumer education and labeling programs (for example, like those proposed under RCI-8) to provide information about the greenhouse gas emissions consequences of using consumer products containing HFCs and other ODS<sup>40</sup>.
- As part of the Western Climate Initiative, negotiate a cap on HFCs and PFCs. A cap would provide some security against runaway emissions, and would allow flexibility for actions beneath the capped level.
- As part of the Western Climate Initiative, develop model legislation to prohibit:
  - Windows containing fluorinated gases
  - One component foams containing fluorinated gases
  - Novelty aerosols containing fluorinated gases
  - Non-confined direct-evaporation systems which use ODS gases as the refrigerant
- Create state procurement standards that declare a presumption against the use of HFCs and PFCs; they should be eliminated when technically feasible. The standards can serve as models for local governments, business and institutions.
- Launch a campaign aimed primarily at consumers and secondarily at retailers of personal technical products containing ODS. This option has the goal to encourage distributors and manufacturers to phase out the use of consumer aerosol ODS products.

### *Mobile Air Conditioning*

- Adopt a policy that adds any refrigerant with a GWP of 150 or more to the EPA phase-out schedule for refrigerants in mobile air conditioners (MAC). As a party to the Montreal Protocol, the United States has already agreed to meet Protocol limits by phasing-out HCFC-141b, HCFC-142b and HCFC-22, the most damaging of the HCFCs. WA can use current EPA regulations to model extended product phase out.

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<sup>40</sup> Aerosol computer keyboard cleaners containing HFCs release significant GHG CO<sub>2</sub>e when used, and are an example of a product to which a combination of education and labeling programs might apply.

- Join with the Society of Automotive Engineers (SAE), the European Union, and the California Air Resources Board to adopt common testing and engineering standards for existing MAC.
- Ensure that state fleet managers follow the recommendations of EPA's Mobile Air Conditioning Climate Protection Partnership. Work with local governments, Clean Air Agencies and the Clean Cities Coalition to promote the Partnership. The Partnership recommends:
  - More efficient refrigerant recovery and more accurate charging equipment and procedures.
  - Improved leak detection (tools and procedures).
  - Mandatory repair of A/C system leaks before system recharge.
  - Quality components; correct installation and connections.
  - Reduction of emissions from refrigerant container heels.
  - Elimination of DIY recharge of leaking systems.
  - Better compliance with recovery requirements and more efficient recovery at vehicle end of life.
  - Restricting sale of refrigerant only to certified technicians.

*Commercial refrigeration, air condition and heat pump equipment*

- Consider adopting regulations similar to those in the EU, specifically:
  - Regulate the containment, leakage, use, recovery of ODS, using labeling, reporting, prohibition, and training for servicing personnel and operators.
  - All owners of equipment and fire protection systems containing 300 kilograms or more of fluorinated gas are required to install leak detection systems.
  - For systems less than 300 kilograms, appliances will be checked for leaks once a year, or every six months depending on the amount of gas.

SF<sub>6</sub>

- Consider whether utility SF<sub>6</sub> control/management should move from voluntary initiatives to mandatory. For example, as part of the annual fuel mix disclosure requirements of RCW.29A, utilities could be required to report annual SF<sub>6</sub> emissions and current policies and programs to reduce them.
- Urge all state electric utilities to join the EPA SF<sub>6</sub> Reduction Partnership for Electric Power Systems.

**Related Policies/Programs in Place**

Aluminum and Cement Production

Actions directed at the Aluminum and Cement production industry reductions can model the Environmental Protection Agency's voluntary aluminum industrial partnership (VAIP). Companies that participate in this program agree to report GHG emissions to create a baseline and report on estimated reductions. This program also monitors PFCs. The state mitigation option would expand this program, make it mandatory and add standards and/or requirements above.

There is a National Performance Standard for Cement production based on the performance of the maximum achievable control technology (MACT) and standards for hydrocarbons and hazardous air pollutants. The state mitigation option could build upon this program and add standards and requirements for GHG pollutants.

#### HFCs and PFCs

The European Commission has a directive to reduce HFCs, PFCs and sulfur hexafluoride (F-gases). The directive bans all F-gases with a GWP of more than 150 for new models.

The Commission also regulates commercial refrigeration through reduction, leakage control and restrictions on F-gases use.

#### SF<sub>6</sub>

The EPA administers SF<sub>6</sub> Emission reduction partnership for electric power systems. The partnership works to identify and implement cost effective solutions to reduce SF<sub>6</sub> emissions. Eighty-one utilities participate in the program, including *[text not yet provided]*.

### **Type(s) of GHG Reductions**

CO<sub>2</sub>, HFC, PFC and SF<sub>6</sub>.

### **Estimated GHG Savings (in 2020) and Costs per MtCO<sub>2</sub>e**

- **Data Sources:**
  - King Country has prepared an analysis of the use of blast-furnace slag and fly ash in road construction. The City of Seattle is currently preparing a similar analysis.
- **Quantification Methods:**

Proposed Quantification Approach: Two specific types of non-energy GHG reductions are proposed in this option—CO<sub>2</sub> emissions from cement manufacture, reduction of emissions from non-CFC ODS use. To estimate the reductions from changes in the cement industry, it is proposed to apply the 10 percent reduction goal noted above, phased in from the start of the program through 2020, and apply that goal to a projection of the amount of cement product produced in the state annually. Studies are needed on costs of different methods of reducing CO<sub>2</sub> emissions from cement manufacture, and to assess which methods are the best candidates for inclusion. To estimate reductions from changes in the use of ODS substitutes for refrigeration, air conditioning, and other uses, it will be necessary to estimate the fractional reduction in average GWP for the overall set



of products used relative to what would have been used in the absence of the option (this in turn is a function of the reduction provided when substitutes are used, the fraction of uses of ODS compounds for which substitutes are possible, and the fraction of the applications in which substitutes are possible where substitution actually takes place). An estimate of the average GWP reduction thus calculated can be applied to the projection for emissions from ODS substitutes included in the Inventory and Forecast to estimate emissions reduction. Net costs for ODS substitutes will be sought from existing studies, with the TWG's assistance.

- **Key Assumptions:**

**Contribution to Other Goals**

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

**Key Uncertainties**

At present there is not enough blast furnace slag and fly ash produced in Washington to supply all of what the state could use for road construction and other emissions-reduction strategies. Transport from other places, including Alberta, and even China (as ballast in freighters) is possible, but analysis of the net impacts of transporting and using these materials is needed.

**Additional Benefits and Costs**

[Insert text here]

**Feasibility Issues**

[Insert text here]

**Status of Group Approval**

TBD

**Level of Group Support**

TBD

**Barriers to Consensus**

TBD

## ANNEX: Additional Analysis Details for Preliminary Analyses

### Estimate of Mitigation Option Costs and Benefits for Washington RCI GHG Analysis

#### RCI-1 Demand Side Management Programs Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil

Date Last Modified: 9/23/2007 C.Lee/D. Von Hippel

Key Data and Assumptions	2012	2020/all	Units
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#### First Year Results Accrue

2009

#### Current/expected utility efficiency spending

Fraction of gas utility revenues spent on efficiency

0.25%

Fraction of Propane (LPG) and Fuel Oil revenues spent on efficiency

0.00%

*Placeholder values--to be replaced with current WA data.*

Year that action begins

2007

Year that target is achieved

2007

#### Following Assumptions Used for both Current/expected and New Programs

Fraction of Statewide Natural Gas Sales Covered

Residential

100%

Assumption

Commercial

100%

Assumption

Industrial

100%

Assumption

Fraction of Statewide Petroleum (LPG plus other oil products) Sales Covered

Residential

100%

Assumption

Commercial

100%

Assumption

Industrial

15%

Assumption

*Placeholder estimates. Industrial value takes into account that large shares of industrial fuel use in WA is "still gas" used in refineries (?) and petroleum coke use, both of which are probably not reasonable to cover under this type of DSM program. The 15% estimate for the industrial sector assumes roughly that distillate oil and LPG sales only are covered by the DSM program.*

#### Savings Targets

##### Natural Gas

Achievable cost-effective savings in natural gas use as a fraction of total gas demand:

20.00%

*Placeholder estimate.*

Fraction of achievable savings reached under program

100%

Option Goal

Year in which target fraction reached

2020

Option Goal

Year in which programs fully "ramped in"

2012

Assumption

Fraction of full program savings by year

100%

100%

Implied fractional annual gas demand savings

1.9%

1.9%

##### LPG and Fuel Oil

20.00%

*Placeholder estimate--assumed same as Natural Gas for now.*

Fraction of achievable savings reached under program

100%

Option Goal

Year in which target fraction reached

2020

Option Goal

Year in which programs fully "ramped in"

2012

Assumption

Fraction of full program savings by year

100%

100%

Implied fractional annual gas demand savings

1.9%

1.9%

**Natural Gas Savings per Program Spending**

72,700	MCF/yr per \$million
74,881	MMBtu/yr per \$million

Based on average cost of gas DSM programs reported in Tegen, S. and Geller, H., 2006. [Natural Gas Demand-Side Management Programs: A National Survey](#), Southwest Energy Efficiency Project, [www.swenergy.org](http://www.swenergy.org).

**Oil/LPG Savings per Program Spending**

74,881	MMBtu/yr per \$million
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Placeholder value--assumed same as natural gas for now.

**Levelized Cost of Natural Gas Savings**

\$2.1	\$/MMBtu
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Based on the first year costs above and average measure lifetime assumption below

Assumed average measure lifetime

8	years
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**Avoided Delivered Natural Gas Cost**

\$6.1	\$/MMBtu
-------	----------

See common assumptions

**Levelized Cost of LPG and Fuel Oil Savings**

\$2.1	\$/MMBtu
-------	----------

Placeholder value--assumed same as natural gas for now.

Assumed average measure lifetime

8	years
---	-------

**Avoided LPG Cost**

\$7.5	\$/MMBtu
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**Avoided Distillate Oil Cost**

\$8.5	\$/MMBtu
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**Approximate Weighted-average RCI Oil Products (including LPG) Cost for Covered Sales**

\$8.2	\$/MMBtu
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See common assumptions. Note that these costs are based on wholesale prices.

Other Data, Assumptions, Calculations	2012	2020/all	Units
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**Calculations used to estimate target spending levels**

During 2008-2020 period, implied new annual energy savings from:

Current/expected gas utility spending	371	412	Billion Btu
Current/expected spending on fuel oil/LPG programs	0	0	Billion Btu
Meeting RCI-1 Savings Target--Natural Gas	1,977	4,568	Billion Btu
Meeting RCI-1 Savings Target--Oil Products (including LPG)	381	844	Billion Btu

**Analysis**

RCI Gas Sales Covered	(from inventory)	214,735	239,815	Billion Btu
Residential		84,448	91,339	Billion Btu
Commercial		52,594	57,111	Billion Btu
Industrial		77,693	91,365	Billion Btu
Conversion Factor: Million Btu per Thousand Cubic feet			1.03	MMBtu/Mcf

**RCI Gas Prices (statewide averages, real 2005 dollars)**

Residential	\$10.36	\$10.42	\$/MMBtu
Commercial	\$9.06	\$8.98	\$/MMBtu
Industrial	\$8.10	\$8.07	\$/MMBtu

2005 gas prices are from EIA (see "NGPrices current" worksheet in this workbook).

[http://tonto.eia.doe.gov/dnav/ng/xls/ng\\_sum\\_lsum\\_dcu\\_SNC\\_a.xls](http://tonto.eia.doe.gov/dnav/ng/xls/ng_sum_lsum_dcu_SNC_a.xls). Changes in sectoral gas prices indexed to future gas prices from DOE EIA Annual Energy Outlook 2006 national forecast.

Total Implied Gas Revenues Covered (RCI, statewide)	\$1,981	\$2,202	\$million
Residential	\$875	\$952	\$million
Commercial	\$476	\$513	\$million
Industrial	\$629	\$737	\$million

RCI Oil Products (including LPG) Sales Covered	(from inventory)	40,797	44,335	Billion Btu
Residential		16,144	17,735	Billion Btu
Commercial		5,905	5,900	Billion Btu
Industrial		18,747	20,700	Billion Btu

**RCI Oil Products Prices (estimated averages, real 2005 dollars)**

Residential	\$8.14	\$8.12	\$/MMBtu
Commercial	\$8.38	\$8.36	\$/MMBtu
Industrial	\$8.46	\$8.44	\$/MMBtu

Cost estimates based on 2005 distillate oil and LPG US wholesale prices, escalated using AEO2006 distillate oil price projections (DOE EIA Annual Energy Outlook 2006 national forecast).

Total Implied Oil Products Revenues Covered (RCI, statewide)	\$339	\$368	\$million
Residential	\$131	\$144	\$million
Commercial	\$49	\$49	\$million
Industrial	\$159	\$175	\$million

**Investment in Efficiency Programs****Current/expected utility efficiency spending**

Efficiency Spending, Natural Gas Utilities	\$5.0	\$5.5	\$million
Fraction of Natural Gas Revenues Spent	0.25%	0.25%	
Efficiency Spending, fuel oil/LPG programs	\$0.0	\$0.0	\$million
Fraction of fuel oil/LPG Revenues Spent	0.00%	0.00%	

**Investment to meet RCI-1 Savings Targets**

Efficiency Spending, Natural Gas Utilities	\$54.6	\$61.0	\$million
Fraction of Natural Gas Revenues Spent	2.76%	2.77%	
Efficiency Spending, fuel oil/LPG programs	\$10.4	\$11.3	\$million
Fraction of fuel oil/LPG Revenues Spent	3.06%	3.06%	

Additional Results	2012	2020	Units
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**Current/expected utility efficiency spending**

Reduction in Natural Gas Use (Cumulative)	2,304	5,489	Billion Btu
as % of overall projected sales in that year	0.75%	2.29%	
GHG Emission Savings, Natural Gas	0.1	0.3	MMtCO <sub>2</sub> e

## Reduction in Oil and LPG Use

as % of overall projected sales in that year	0	0	Billion Btu
	0.00%	0.00%	
GHG Emission Savings, Oil and LPG Use	0.0	0.0	MMtCO <sub>2</sub> e

**Investments to Meet RCI-1 Savings Target--Natural Gas**

Reduction in Gas Use (Cumulative)	2,949	45,153	Billion Btu
as % of overall projected sales in that year	1.42%	18.83%	
Incremental GHG Emission Savings, Natural Gas	0.2	2.4	MMtCO <sub>2</sub> e

**Investments to Meet RCI-1 Savings Target--Fuel Oil/LPG**

Reduction in Fuel Use (Cumulative)	569	8,477	Billion Btu
as % of overall projected sales in that year	1.42%	19.12%	
Incremental GHG Emission Savings, Fuel Oil/LPG	0.0	0.6	MMtCO <sub>2</sub> e

*Note that emission factor used here covers all RCI petroleum use, not just those uses of petroleum (and LPG) included in RCI-1, and as such may slightly (by a percent or two) under-count emissions savings, since the average industrial-sector emission factor is probably somewhat less than an emission factor for industrial distillate and LPG use only.*

**Economic Analysis****Investments to Meet RCI-1 Savings Targets****--Natural Gas Utility Programs**

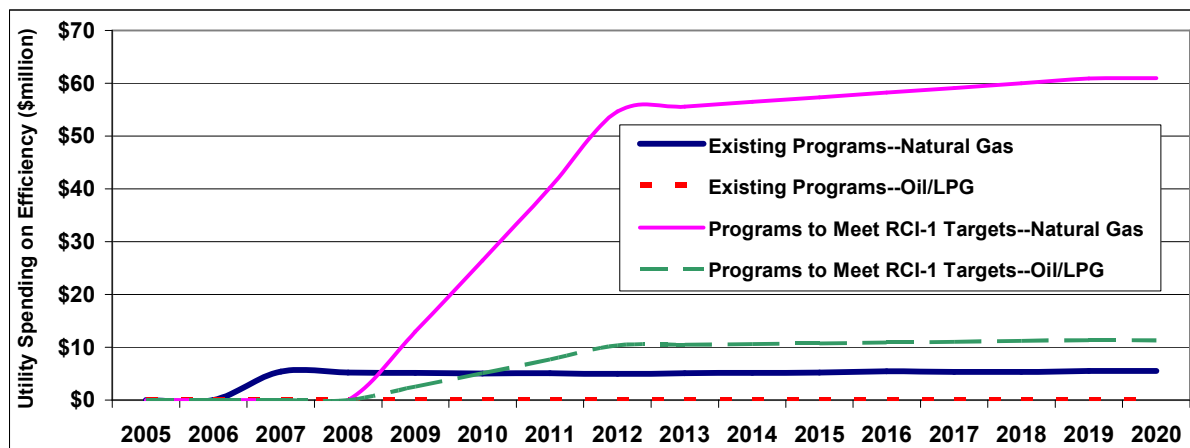
Net Present Value (2008-2020)	-\$642	\$million
Cumulative Emissions Reductions (2008-2020)	13.5	MMtCO <sub>2</sub> e
Cost-Effectiveness	-\$47	\$/tCO <sub>2</sub> e

**--Fuel Oil/LPG Programs**

Net Present Value (2008-2020)	-\$149	\$million
Cumulative Emissions Reductions (2008-2020)	3.3	MMtCO <sub>2</sub> e
Cost-Effectiveness	-\$45	\$/tCO <sub>2</sub> e

**--Total of Electric and Gas Programs**

Incremental GHG Emission Savings, Natural Gas and Oil/LPG	0.7	3.0	MMtCO <sub>2</sub> e
Net Present Value (2008-2020)		-\$791	\$million
Cumulative Emissions Reductions (2008-2020)		16.8	MMtCO <sub>2</sub> e
Cost-Effectiveness		-\$47	\$/tCO <sub>2</sub> e

**Notes and Sources****Note 1:**

## Estimate of Mitigation Option Costs and Benefits for Washington RCI GHG Analysis

### RCI-5 Rate Structures and Technologies to Promote Reduced GHG Emissions

Date Last Modified: 9/26/2007 D. Von Hippel/Michael Lazarus

#### Key Data and Assumptions

2012	2020/all	Units
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The following calculation estimates GHG emissions reductions from two elements of RCI-5, inverted block tariff structures, and introduction of "smart meters" for electricity consumers. Other elements of RCI-5 provide GHG emissions reductions largely through supporting other policies in the RCI and Energy Supply sectors.

#### First Year Results Accrue

2010
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#### Savings from Smart Meters and related rate structures for Residential Consumers

Reduction in Residential Electricity Use

8%
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A review of smart metering-related studies and pilot installations (*Smart meters: commercial, regulatory and policy drivers*, by Gill Owen and Judith Ward of Sustainability First, dated March 2006, Appendices document "Appendix 2 – Smart metering experience and studies", p. 19 to 34 in document available as <http://www.sustainabilityfirst.org.uk/docs/smartmeterspdfappendices.pdf>) suggests potential savings in a range of about 8 to 12 percent of consumption. Further input on this assumption is sought from the TWG

#### Cost of Smart Meters per Meter

\$200
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#### Assumed Cost of Implementation of Tariffs for Smart Meters and of Inverted Block Rate Structures

\$0
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\$/MWh

In practice, there are likely to be some costs associated with smart meter tariff structures, including program costs, changes to billing systems, and possibly (in some cases) changes to metering or meter-reading systems. These costs are not explicitly accounted for in this analysis, but are likely to be quite small relative to the electricity cost savings achieved through the policy.

#### Savings from Inverted Block Rates for Residential Consumers

Reduction in Residential Electricity Use

4%
----

Based on estimated from THE NEW MOTHER LODGE: The Potential for More Efficient Electricity Use in the Southwest prepared by the Southwest Energy Efficiency Project (SWEET), November, 2002, [http://www.swenergy.org/nml/New\\_Mother\\_Lode.pdf](http://www.swenergy.org/nml/New_Mother_Lode.pdf). The estimate is based on a simple econometric calculation, assuming a three-block tariff, with the highest block having a tariff 50 percent higher than the average tariff for households, and the lowest block having a tariff half of the average tariff, so that the overall tariff structure was revenue-neutral. Based on empirical studies of the price elasticity of demand for electricity, the authors of the SWEET study estimate an average savings of about 4% of residential as of 2000.

#### Fraction of Residential Consumers to Whom Inverted Block Rates are Applied

35.00%
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Placeholder Assumption, but takes into account that somewhat under 60 percent of Washington's residential electricity consumers are served by utilities that currently have strongly-tiered inverted block rate structures. (Information on utility rate structures as of 2003 received from Stacy Waterman-Hoey of CTED.)

#### Avoided Electricity Cost (Residential)

\$43
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\$/MWh

See common assumptions.

#### Target Number of Smart Meters Installed Under Pilot Program of Residential consumers, or consumers as of 2010.

1.00%
28,303

#### End Date of Pilot Program and End of Phase-in of Inverted Block Rates

2012
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#### Target Fraction Additional Residential Consumers Using Smart Meters, Full Program

0%
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Placeholder Assumption—no provision for full program currently in option description.

#### Start Date of Full Program

2012
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#### Full Phase-in Date of Full Program

2020
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Other Data, Assumptions, Calculations		2012	2020/all	Units
<b>Residential Electricity Sales</b>		35,408	38,095	GWh
<b>Residential Customers</b>		2,904,017	3,200,267	
<i>2005 customer number based on DOE EIA data. Assumes, until a separate projection of customer numbers is available, that growth in number of residential electricity customers will track growth in WA population.</i>				
<b>Implied Consumption per Customer</b>		12.19	11.90	MWh
<b>Cumulative Number of Installed Meters Under Pilot Program</b>		9,434	28,303	
<b>Cumulative Number of Installed Meters Under Full Program</b>		-	-	
<b>Cumulative Number of Consumers for Whom Inverted Block Rates Apply Under Program</b>		330,198	1,120,093	
<b>Factors for Annualizing Capital Costs (Residential Smart Meters)</b>				
Interest Rate (real)			7%/yr	
Economic Life of Meter	<i>(Rough estimate)</i>		15 years	
Implied Annualization Factor			10.98%/yr	
<b>Implied Annualized Cost of Meters</b>			\$ 21.96/meter-yr	
<b>Intermediate Cost Results, Pilot Smart Meter Program</b>				
Total up-front meter costs for meters installed in each year		\$ 1,887	\$ -	thousand
Annualized Meter Costs		\$ 207	\$ 621	thousand
<b>Intermediate Cost Results, Full Smart Meter Program</b>				
Total up-front meter costs for meters installed in each year		\$ -	\$ -	thousand
Annualized Meter Costs		\$ -	\$ -	thousand



Results	2012	2020	Units
<b>Electricity</b>			
TOTAL Reduction in Electricity Sales, Pilot Smart Meter Program	28	27	GWh (sales)
Reduction in Generation Requirements, Pilot Smart Meter Program	30	29	GWh (generation)
TOTAL Reduction in Electricity Sales, Full Smart Meter Program	0	0	GWh (sales)
Reduction in Generation Requirements, Full Smart Meter Program	0	0	GWh (generation)
TOTAL Reduction in Electricity Sales, Inverted Block Tariff Program	496	533	GWh (sales)
Reduction in Generation Requirements, Inverted Block Tariff Program	534	574	GWh (generation)
<b>Totals for Pilot Smart Meter Program</b>			
Total Net GHG Emission Savings, Pilot Program	0.01	0.01	MMtCO <sub>2</sub> e
Net Present Value (2008-2020), Pilot Program		-\$4	\$million
Cumulative Emissions Reductions (2008-2020), Pilot Program		0.1	MMtCO <sub>2</sub> e
Cost-Effectiveness, Pilot Program		-\$26	\$/tCO <sub>2</sub> e
<b>Totals for Full Smart Meter Program</b>			
Total Net GHG Emission Savings, Full Program	0.00	0.00	MMtCO <sub>2</sub> e
Net Present Value (2008-2020), Full Program		\$0	\$million
Cumulative Emissions Reductions (2008-2020), Full Program		0.0	MMtCO <sub>2</sub> e
Cost-Effectiveness, Full Program		#DIV/0!	\$/tCO <sub>2</sub> e
<b>Totals for Inverted Block Rates Program</b>			
Total Net GHG Emission Savings	0.09	0.29	MMtCO <sub>2</sub> e
Net Present Value (2008-2020)		-\$148	\$million
Cumulative Emissions Reductions (2008-2020), Full Program		2.8	MMtCO <sub>2</sub> e
Cost-Effectiveness		-\$54	\$/tCO <sub>2</sub> e
<b>Totals for Policy (Pilot plus Full Smart Meter Programs, plus Inverted Block Program)</b>			
Total Net GHG Emission Savings	0.09	0.30	MMtCO <sub>2</sub> e
Net Present Value (2008-2020)		-\$152	\$million
Cumulative Emissions Reductions (2008-2020)		2.9	MMtCO <sub>2</sub> e
Cost-Effectiveness		-\$52	\$/tCO <sub>2</sub> e